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FOR THE SCHOOL-ROOM AND THE STUDY

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MR. MICHAEL E. SADLER AND THE NATIONAL HOME-READING UNION.

On previous occasions we have called the attention of our readers to the objects of the National Home-Reading Union, and particularly to its endeavours to encourage and guide the reading of young people and of classes in day and evening schools. We wish here to refer to a new departure in the work which may specially interest teachers. It will be known to those who have read former notices that the Union selects and recommends books for readers who desire to study special subjects. For the season just begun there has been added to the number of special courses one on the subject of education.

"Until recent years," says the secretary, "there has hardly been any recognition in this country of a science under this name. But latterly, under the stimulus of the Elementary Education Acts, and the proposed legislation for secondary teachers, a new and almost national interest has been awakened in the subject. Professional teachers are everywhere on the alert, desiring to enter into fuller sympathy with and knowledge of what leading thinkers and workers in the educational world have been thinking and doing..... English writers from early Tudor times have recognised that special parts of the field have been laboured in; foreign workers have contributed their theories and suggestions: it will be the aim of this course to give readers a closer acquaintance with some of these branches of study."

One way in which the National Home-Reading Union assists its readers is by securing the issue of selected works on specially favourable terms. For this course on education they have arranged with publishers for special cheap editions of four selected works, and the saving in the cost of these books will practically cover the fee for membership.

Another form of help is given in articles written expressly for the monthly magazine of the Union. Mr. H. T. Marks, B.A., B.Sc., of the Day Training Department, Owens College, himself the author of one of the books for study, has undertaken to write a series of nine articles introductory to and explanatory of the books to be read in the course on education. The book list and the magazine are sent post free to members of the course.

MEETING OF LONDON TEACHERS.

In order to bring the new departure conspicuously before the persons most likely to be interested in it, the National Home-Reading Union arranged for a meeting in the Council Chamber of the London School Board, and invited all the head-teachers of Board and voluntary schools and responsible teachers of evening continuation schools in London to attend and hear addresses from Mr. Michael E. Sadler of the Education Department, and Mr. J. L. A. Paton of University College School. At the appointed time on 20th October the large room was crowded to excess by some hundreds of teachers. The meeting was presided over by Lord Reay, chairman of the School Board, and he was supported by Dr. Hill, Sir Joshua Fitch, Mr. T. Clancy, president of the N.U.T., Mr J. H. Yoxall, M.P., Mr. Frederic Harrison, the Hon. Lyulph Stanley, Mr. A. J. Mundella, Dr. Kimmins, Mr. Lidgett, and others.

The chairman referred in his opening remarks to the great and most useful work of the National Home-Reading Union, and thanked the society for the valuable help it is giving to the work of the Board, which is more and more prepared to avail itself, especially in the evening continuation schools, of the Union's advice in the selection of books. He suggested that something might be done to assist politicians in the choice of reading. It was difficult to know what special kind of literature the politician should make his own,

Next Month:

ON A DANUBE STEAMER FROM VIENNA TO TURN-SEVERIN.

By Catherine I. Dodd.

and he feared that no class was more guilty of desultory reading. He warmly commended the practice of having the results of the students' reading put into writing in the form of essays, for he believed a great deal more must be made in our educational system of composition.

ADDRESS BY MR. M. E. SADLER.

Mr. Michael Sadler, M.A., said:—

"On the occasion of meetings held under the auspices of this Union, you have often listened to addresses from distinguished men of letters and great scholars, who have spoken, out of the fullness of their knowledge, words of more than passing importance. On the present occasion I feel that I can only address you on behalf of the work of this Union from the standpoint of unappeased literary hunger. I dare-say that there are some here who, like myself, are always fighting a losing battle for leisure. If there are many others in my case, the admirable and attractive publications of this Union must always excite their hungry desire. You know that little, square, blue, well-arranged pamphlet which is called *Complete Book Lists for the Year 1899–1900*. I am inclined to think that pamphlet, and a well-illustrated stores list, and the prospectus of a good tourist agency are, for busy people who can hardly ever get what they want, the most tantalising bits of literature in existence. But for those of us who suffer not merely from the want of a list of books that we may not read, but from want of time to read the books we have already—for those of us there is a function to-day, and that is to say that we, perhaps more than anybody else, are able to appreciate and admire what this Union has done and plans to do. It is a good work. It has behind it a high social purpose, nobly conceived and faithfully pursued. It is served by officers who are absolutely devoted to the cause which the Union represents; and there are some of us here who will always feel for the founder of this Union, Dr. Paton, lasting gratitude for sympathy which is always tender, and for a faith in human nature which is always buoyant and true. This Union incites us to read; it gives us, when we need it, direction in our reading; and it finds for us what it is not always easy to discover—personal guidance in the course of our study. It encourages us; it gives us that happy sense of comradeship in work; and more than that, but by example rather than precept, it reminds us that when we have got knowledge, we ought to make an unselfish use of it.

"Now I should like to say a few words about some of the part which this Union may bear in the great work of national education in England at the present time; and I would begin with two provisos. First, I think we are hardly any of us likely to fall into the mistake of thinking that reading is the only instrument or fruit of true culture. Of course, active-minded and assimilative reading is a necessary part of all culture; but passive reading and inert reading are not so, and still less is the reading which is a substitute for thinking, or which is taken as a remedy for thinking. The author of the epigram that 'the true modern university is a library' would, I feel sure, have been the first to qualify it had he known some of the uses to which that saying has been put. Why, you cannot use a library properly unless you go to it equipped with a liberal education; and even if you start with that advantage, how long is it, even in the study of some special subject to which you have given much time and thought, before you have to fall back upon the invariable courtesy of an accomplished librarian? And, of course, when you pass outside your own special subject into the subjects which border upon its frontiers, you need the expert's personal help more than ever. And may we not all say here—we are an expert audience—that in our own special subject, education, this is truer than in the case of almost any other? Education is not a subject by itself at all. What geography is to the physical sciences, education is to the moral—it is the focus and meeting-point of economics, ethics, psychology, didactics, and politics; and no one can study education in the right spirit, the historical spirit, the candid spirit, or the critical spirit, who is not in some measure equipped in each of those great branches of human discipline.

"The second proviso I should like to make is this: Ought we not to be always on our guard against consciously or unconsciously thinking of national education as if it were a mere matter of school alone? The greatest schoolhouse is the house of Life, and in the house of Life all are teachers who interpret it. Ought we not to keep our schools close at every point to the deep permanent interests and duties of life? I do not for a moment mean that we ought in the school, and especially in the school for little children, to anticipate any of the fuss, and the worry, and the specialised activities which come to later life. I would have a school a haven of peace; but you can have it that, and yet have it close to the deep meaning of life, all the same. Education, true education, never hurries; the best school always plays the waiting game: but by the waiting game we do not mean sleepy routine. And never before in the history of the world has it been so incumbent on a nation to clear the lumber from its schools. Those teachers serve best who serve with a quiet mind. But teaching is not a trade—it is a fine art; and the teacher, like the painter, shows his genius in knowing what to leave out of his studies in order that the representation may be true to life. In that sense I would earnestly plead that schools should not be bookish things only, but that they should be open to all the deeper influences of life. And though information is all very well in its way, surely the best fruit of education is what William Law called 'the wisdom that standeth at all our doors, which appealeth to all our senses, teaching us in everything and everywhere, by all we see and hear, by births and burials, by sickness and health, by pains and poverty, by misery and vanity, by all the changes and chances of life,' and, above all, by sorrow nobly borne.

"Now with these two provisos I should like to say a little as to the part which this Union may bear in national education in this wider sense. And, of course, I need not say that whatever falls from my lips to-day is purely individual, and in no sense official. Almost against its will, the world is getting more interested in education every day. I do not mention this as a mark of the advance of humanitarian ideas, certainly not of humanitarian ideas alone; it is not an episode in the history of philanthropy—it is a grave political fact. Two great sources of power—sea power and school power—are becoming more and more the objects of conscious national desire. It is dawning upon people that by means of a highly-organised school system, the state may exert a distinct control—conceivably a paramount control—over ubiquitous sources of public opinion. I mean by the state that organised aspect of the nation which really governs us. Now it is the instinct of the state to extend its power. The drift of things is for the state to extend its control over education: how that power will be used depends on the character and the aim of the state. The organisation of educational forces may be, under certain conditions, something very different from an affair of philanthropy, though tags of philanthropic language may cling to it as remnants from former times.

TWO IDEALS OF EDUCATION.

"I have said that the world is becoming more interested in education every day. Those whose duty it is to watch the progress of educational comment and propaganda will, I am sure, endorse this assertion. But people may mean very different things by the word 'education.' And if we look beneath the surface of merely verbal agreement, we can trace two very different ideals of primary education, in conflict, though as yet generally unconscious conflict, with one another. I will attempt to define these two conflicting ideals, though in the very act of doing so I shall have to remove a certain vagueness of outline which causes the one often to be mistaken for the other, and therefore to be praised or blamed as something not itself.

"To one order of mind it seems best to work towards a system of state education, enforced on all children between certain ages with effective compulsion; precise in point of its carefully-prescribed curriculum; organised with exact efficiency; homogeneous in aim; as far as possible, uniform in moral and political tone; as far as may be, a state monopoly; well officered, well found, well equipped, well drilled; skilfully designed for the specific purpose of furnishing the

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rising generation of the working classes with that range of knowledge, with that habit of assimilation and obedience, and with that attitude of mind towards government and the existing order of society, which seem calculated to produce social order, and to enhance industrial productiveness on certain lines. After a certain number of years of gradual adjustment and continuous care, the system may be brought to a high point of efficiency combined with economy. Under its influence the average level of intelligent knowledge may be indisputably raised. Certain kinds of industrial organisation may be facilitated by it. On the other hand, the system tends to encourage the tame and passive qualities. *Verve* and variety and indocility are foreign to it. If I may be pardoned the figure, the meat is good, though somewhat lacking in flavour, and *boned*.

"To another order of mind, the ideal which I have tried to describe is repulsive. Those whom it repels are inclined to measure the merits of education by its power of morally and intellectually enfranchising the individual citizen. To them the individual is not simply a unit in the nation to which he happens to belong, but one possessing certain sovereign and indefeasible rights over against which, under certain conditions, even the material interests of his country have no right to prevail. They will not regard the individual as a mere screw in the machine. From this point of view, the greatest merit of education lies in developing interests rather than in discipline. Motive counts for more than the level of attainment. It rejects any mechanical obedience to the existing social order. It seeks to bring the pupil's every thought into captivity to a standard of goodness which is not external, but in the heart. Far higher than the duty of simply securing the material welfare of the state, or of hardening its organisation, is the duty of providing, so far as what is external to the man himself ever can provide it, effective equality of moral and intellectual opportunity for every citizen. Those who take this view rightly concentrate their chief attention on the education given during the early years of childhood. The primary aim of primary education is to individualise the children. Almost the chief part of the teacher's work is to discover individual capacity in each different child, stimulate and nurture it, give it scope and training, and so to enrich the community with the utmost variety of individual excellences. Those who incline to this view are often rather vaguely optimistic as to the future of the state. Like the older economists, they cling to a more or less unspoken belief that the ultimate outcome of highly-differentiated individual characteristics will coincide with the equilibrium of the state itself. But even if their faith was challenged, and they found themselves unable to prove its truth, they would not therefore surrender their educational principle. They would rather argue that, sooner than crush individuality in the children, it would be better for the existing state to perish, and its place to be taken by some other form or association—possibly communal association—more compatible with individual development and human happiness. To them the idea of a fixed or frozen curriculum is intolerable. 'In the ideal democratic school,' as Professor Eliot of Harvard has remarked, 'no two children should follow the same course of study, or have the same task, except that they would all need to learn the use of the elementary tools of education—reading, writing, and ciphering.' (I cannot think why he throws the last in.) 'The different children would hardly have any identical needs. The pretended democratic school with an inflexible programme is fighting not only against nature, but against the interests of democratic society.' Flexibility of organisation, infinite variety of combination, free choice of alternative studies—these are the ideals of this group of thinkers. In their eyes, every subject in every curriculum is constantly in need of checking. None, not even the most venerable, can claim a prescriptive right to be permanently retained. Each must prove its right to be there. The school cannot afford room for lumber or time for dreary routine. Every minute must be made to count, every bit of effort to tell. That is the law of modern business, and, they would add, of modern education too. And there are some, the most thoroughgoing amongst them, who would deny the rightness of compulsion in education. They would have it perfectly efficient, absolutely gratuitous, and entirely voluntary. But voluntary or not, education on these lines would, as has been said, imperatively call for larger expenditure than is now generally contemplated as even remotely possible. The essential weapon for this ideal of education is the small class—the *very* small class. You cannot give this kind of individualising education to a regiment; you can only give it to a handful. You must allow every teacher to know and love every child individually and one by one, in school and out of school; and the influence and oversight of the teacher must overlap the schoolroom, must 'overshadow playtime, and must weave itself into, and if necessary refine and even replace, the influence of the home.

"Now behind each of these two ideals there are great forces. Behind the first are a number of economic and social forces—some would say self-preserving forces—some noble and some sinister; and behind the second ideal is one of the most tremendous explosive things in existence—pity for the lot of the individual poor—a form of missionary impulse which is as much stronger than statecraft as faith is stronger than self-interest. When Pestalozzi met Napoleon, the two ideals stood face to face with one another in human presence. Napoleon showed the insight of genius when he thought it worth while to talk over with quaint and shabby old Pestalozzi such a matter as how to teach the A B C. I conceive, also, that the same genius led him to perceive that any faithful following out of Pestalozzi's principles and practice would be incompatible with administrative or ecclesiastical centralisation in school affairs.

THE TRUE IDEAL.—THE MIDDLE WAY.

"Now, if you will allow me to say so, I believe personally that each of these two ideals, *when pressed to the extreme*, is a false ideal, and that the truth lies somewhere in the middle distance between the two poles (and the difficulty is that it is at an undetermined and a varying middle distance); but that you need, in an educational system, to get as far as you can the influence of both ideals, and to be under the dominant control of neither. If you take a dispassionate view of the history of English education, it is hard to resist the conclusion that it has been the main tendency of English thought to choose the middle way—the indecipherable, groping middle way between two opposite extremes. That is true of England in so many ways. We are a democracy, and yet charged with the duty of a varied and scattered empire. There is hardly any country in which class distinctions are more obvious, and yet where is there a freer road to recognition for intellectual or moral excellence? We are—if one may say so without conceit—a religious nation, and yet we have always shrunk from any application of religious theory which seems inconsistent with the plain practical duties of life. We are a commercial nation, and yet our highest, or one of our highest, glories is our great tradition of profuse charitable benevolence. And equally so in education—we more and more tend towards individualising in school training, yet we do not forget the concurrent claim of the state. We recognise more and more the unity of national education, but I doubt if the conviction has ever been stronger that there are certain principles, certain interests at stake, which some among us can never surrender at the instance of the state. The great mass of us may, broadly speaking, agree; but on each wing stand large groups of parents and teachers who cling to certain definite principles, not ours, which they can never conscientiously surrender, come what may. There are signs that some of the sharpest contention in the education of the future may turn on what ideal of patriotism shall be taught in the schools, as reflected in the teaching of history, national literature, and the principles of civic duty. To me individually it seems mad and wicked to attempt to eradicate conscientious principles by means of state monopoly. When the state attempts to do so—either way—the primary school brings not peace but a sword. But England stands for comprehension which is strength, that larger unity which includes much that is diverse in aim and method, but bound together with one spirit. I do not at all quarrel with the ideals of other nations—they may be right for them—but surely each nation has its own ideal to work for, learning from all the others. To cling to the broader ideal

I have attempted to define, to raise it to the highest possible point of efficiency in all regards, seems to me the educational mission of England, as distinct from that of all other nations in the world. Of all policies this is the hardest to define: it defies formulæ; it baffles definitions; it is the outcome of good feeling and sympathy, and of a happy instinct for inherent rather than for verbal truth. Of all ideals it is also the most costly and the most difficult to work. It is peculiarly liable to muddle, to a kind of sloppy compromise, and to expensive inefficiency, because it is not precise and clear. And, of course, the corruption of the best is always the worst.

WHAT IS NEEDED.

"Now if it is the task of England to work out this type of national education, which combines the best of the two ideals—which is patriotic, and yet careful of the individual life; free and varied, and yet firm in discipline and training of the will; organised in small classes, and yet in a large spirit of common service—what a task is thereby laid upon our teachers! If we are going to individualise the child, and yet never to forget its duty to the state; if we are going to increase at every point the interest of education, and yet never to relax our hold upon wholesome discipline, only the best teachers will be able for the work. And it will be England's duty to secure for every teacher, in every grade of school, a liberal education to start with; then the best possible professional preparation in the methods of their calling; and in that calling, freedom to know every child in their class, one by one, to detect and develop the individual capacity of each child; ample leisure to pursue their own private studies and to enrich their culture; and, in the larger sense, a conviction of intimate professional association and of service to the state. These are the needs of teachers in English schools; and it seems to me that at the most important point of all the work of this Union comes in: it helps us all—all who are interested in teaching, all who can practise it, all who can revere it when they see it nobly done. It comes in to help us to increase our knowledge in the right spirit. Many of the tendencies of modern education are in the direction, you will observe, of smaller classes. Educational hand-work—really educational hand-work—inventive science teaching, all the methods that individualise the child and make him or her discover and work out things for himself or herself—all this necessarily means small classes, and it necessarily means, too, that the earliest years of education are the most important. And to deal individually and readily with small classes needs, as we all know, a mastery over the details, not of one subject, but of many; and beyond knowledge, that fine poise of judgment, and that delicate touch of sympathy, which mean that the man and woman possessing them have passed through the first conflict of opinion into a state of mental peace, be it only the peace of conscious ignorance.

"Has not anybody who has tried found that the true education of very little children is nearly the most difficult task which one can undertake? You have to meet a child's absolutely unexpected and most disagreeable questions. You may put them off to another day, but your real skill and tact lie in knowing how you can lead the child from that question to knowing more about what he is studying; and to do that requires great knowledge, as well as great sympathy, great alertness of spirit, great insight into child character, and unfailing tact. I am sure that people who are not acquainted with the subject think of the different subjects of instruction as if they rested in layers one above another, like oil and vinegar in bottles. But when you are teaching very little children, you have to shake the bottle before you use it. You have to give them lessons in which the elements of a great many different subjects are held in solution. From this it follows that it is especially necessary to have highly-cultivated teachers for the education of very little children—not only for the education of older ones. This is why the work of this Union is of such special value in our educational life. It provides the kind of guidance in reading—sensible, effective, and easily secured—which many people want. The more our educational standard rises, the more will the service of the Union and of many similar kinds of organisation—the public library, for instance—be constantly under requisition. And I believe that the work of this Union may be of very great advantage indeed to all who are engaged, whether as parents or as teachers, in the training of young as well as of older children; and I most heartily hope that its labours, both in London and elsewhere, may be crowned with an ever-increasing measure of success."

It gives us peculiar pleasure to be able, with Mr. Sadler's permission, to place before our readers the full text of his remarkably thoughtful, suggestive, stimulating, and inspiring address.—ED.

THE CASE FOR MANUAL TRAINING IN SCHOOLS.

BY J. GUNN, M.A., D.SC.,
Author of "Class Teaching and Management," etc.

PART II.

ONE other aspect of brain action demands our notice. We shall take care not to commit ourselves to any theory of cause and effect as existing between brain action and conscious thought; but this much is certain—wherever we have conscious thought we have also brain activity. And the significant thing about this brain activity is this, that it is precisely the same in kind as that which causes muscular movements, though it may be much fainter in intensity.

What we call the idea or mental image of a *circle*, for example, is accompanied by the same brain action as tracing a circle by the hand or following its outline with the eye. A thought is a nascent or repressed *act*. If this seems doubtful to you, ask any friend to describe to you the shape of a spiral staircase, and you will find that nine out of ten, or perhaps one more, will begin the description by moving the finger round in an ascending spiral, unless you put them on their guard beforehand. Rarely, indeed, does the intense image called up in the mind of the person addressed fail to set the forefinger of the right hand moving in a spiral curve.

Again, watch a person reading who is not much accustomed to that mental exercise. The lips move, perhaps the whole vocal apparatus, so that the reading becomes quite audible. Or observe a person in a state of passion or excitement who is not accustomed to self-restraint. The words in his mind find spasmodic utterance: the hands clench as if in presence of a real antagonist. He acts over again the part of Alnaschar, who kicked into fragments the pottery in his basket, while only imagining the pleasure of kicking his wife.

The same phenomenon—that of thought exploding into action—is common in delirium, and in the dreams of disturbed slumber, when the excessive supply of blood in the brain leads to violent brain activity, instead of that suppressed activity which accompanies mere thought.

Or watch children playing a game I have sometimes seen of this kind. They hold something in their hands, and one says, "When I say 'Let go!' you must hold fast; when I say 'Hold fast!' you must let go." The game leads to abundant forfeits. The word "Let go" calls up a mental image, and raises a brain activity which, in spite of the warning, ends in the hand opening.

Or watch the game "Simon says, Thumbs up—Thumbs down." Unless the caution "Simon says" comes first, the thumbs must not move, on pain of forfeit. But at the sharp command "Thumbs up!" thumbs *will* move, in spite of the absence of "Simon." Vivid thought can hardly be restrained from exploding into outward act.

Now the educational bearing of this is plain. Clear and vivid thought impressions are necessary for accurate memory. We recall most easily the images which we apprehend with most energy of thought, or with the greatest brain activity. But the most forcible brain activity is that which accompanies, not mere thought, but muscular movement as well. Hence it follows inevitably that whenever mental im-

pressions are associated with bodily activity, they will be more vividly received and more easily retained than when they come to us passively.

Let me give one illustration of a negative type. There are certain ideas which are always received passively, comparatively at least—those of taste and of smell. There are others which are always actively received, or received along with the performance of muscular movements—ideas of form, though the movement be only that of the eye in tracing the form. Now try which of these two you can recall more easily and more definitely—the odour of heliotrope, or the form of a Celtic cross. Most people will find the former impossible to imagine with any distinctness, but the latter perfectly easy.

A further remark may be made here as regards odours. You may have observed that a smell which you perceive and recognise after a long period, recalls in a flash the whole of the circumstances under which you smelt that odour before. From this well-known fact, some writers have given a high intellectual rank to sensations of smell—higher than to those of sight, for example. If my argument is sound, this power of smell to recall the past proves the exact opposite. For observe, it is not the memory of the past circumstances that recalls the odour; but the odour being once recalled, all the *active* sensations that accompanied it rise into memory. The odour itself was so passive a thing, and the sights and sounds and movements so much more active, that the passive cannot be got at without raising at the same moment, and even more vividly, all that engaged our activities at the same time. We might easily recall the whole of the active part of the same, without recalling the odour, by some other clue of memory. But only the same odour repeated can appeal to so low and passive a memory as the odour of the past. So this phenomenon rather shows how hard it is to revive the memory of what was passively received, and how easy by comparison to recall active sensations.

Ideas of sound even are accompanied by muscular movements, especially in the throat. Listening to an instrument playing flat, or to a voice singing flat, gives many people not merely a disagreeable sensation in the ear, but a feeling of fatigue, and ultimately of acute pain in the throat, due to the vocal chords acting in sympathy with the sound, and trying, as it were, to correct its pitch.

And to give one more example, how many can listen to a speaker affected with sudden hoarseness without involuntarily clearing their own throat? The mental picture of something wrong with the throat of the speaker sets the muscles of the listener's throat in motion, unless one is on his guard against it.

A practical warning in dealing with the young may be mentioned in this connection. If the brain action in idea is only weaker than that in outward act, but the same in kind, how dangerous is it for young and even for old people to read and to imagine scenes in which they should never take part! We often hear of boys and girls being led into evil courses by reading and hearing of evil things. You can easily see from this standpoint how real the danger is. The brain has already performed its part, in forming the idea; to perform a similar part in action is only the natural and inevitable tendency of all thought to result in action—of all brain activity to express itself in muscular activity. And yet how many people will read over in private what they would shrink from witnessing, or at least from being seen by others to witness! And how many journalists will argue that to give publicity to the details of evil is a duty to society, and acts as a deterrent! A study of the relation between brain processes in ideation and in outward action seems to point very much in the opposite direction.

Now the bearing of these facts on school education seems to be clear. Consider first the positive aspect:—to get the clearest ideas and the most active impression, muscular activity should be made use of to the fullest possible extent. You may explain things as fully as words will allow you; but that is a weak process, for the child is passive. But let him see things, touch them, handle them, and move them about; above all, let him make things, by drawing their forms, and especially by constructing and imitating them in some material, be it paper, clay, wood, or what you will, and you give him ideas which language can never express, and which he will never forget. In order to do this, you must train his hand to express what he apprehends. This very training implies a host of new ideas and new capacities acquired, which will bear fruit in every department, not only of doing, but of abstract thinking as well—for in their physical aspect, as we have seen, the two are one.

On the other hand, repress this natural activity of muscle, and what is the result? You do not merely lose this accuracy and force in the ideas presented; you do something far more injurious. You accustom the brain of the pupil to act habitually in the weaker form which accompanies mere thought. You repress the brain energy which should explode into action, and, of course, you cannot tolerate the restlessness and fidgeting which as an alternative is almost necessary to health in a child. You really put a bandage round his brain to diminish the healthy and natural circulation; and if you bandage up any part of the body, you know the inevitable result—stunted growth, atrophy, permanent weakening of the organ, and lessening of its future efficiency. To see how this repression acts, one has only to look at the dull eyes and unexpressive features of a large class supposed to be listening and learning, or of a well-behaved congregation under a tedious preacher. Is it to be wondered at that our common school children are sometimes accused of being dull and wanting in individuality, in resource, and in all that makes a boy of real value in actual work, when he leaves school?

How little self-activity do we find room for in our formal schemes of education! A little speaking, reading, and answering questions, a little mechanical writing, and perhaps no less mechanical drawing; for the rest, looking and listening! And yet we expect these schemes to help boys and girls in growing up to perfect men and women. As well expect a boy to grow up strong and athletic if you bandage up his limbs, and only allow him to move his toes and fingers. We urge our pupils to think, to use their brain, forsooth, while we ignore all the time what the proper and natural use of the brain really is. And granting even to the fullest all that is said of the brain as the organ of thought, it is not from a repressed or atrophied brain that thought worth the thinking will ever come.

Then we must not forget the stimulus of *interest*, and its value in producing vigorous thought. Without arousing the pupil's interest, we cannot educate him. We may cram him in spite of himself, but not educate.

Now, as regards interest for an ordinary healthy human boy, compare for a moment hand work and book work—whittling with a knife, and parsing personal pronouns; translating Cæsar's description of his bridge over the Rhine, and constructing a model bridge of his own. We need only mention such a comparison to see which will lead to more earnest, permanent educative effort. I think we all have a kind of unconfessed sympathy with the boy who plays truant from school—the boy whose nerves tingle all through and through with a vitality that *will not* be repressed. He must get away out-of-doors and use those young limbs of his that were so evidently meant to be used. Think, then, of a school where all the boys would be allowed to play truant for a large part of every day; to spend the time in real boys' work—which, after all, is a kind of play, as Froebel saw; to play truant from decimals, and infinitive moods, and other ghosts of things, and to revel in making real things that boys like to make, in the school workshop. We could even invent a new punishment in such a school: if a boy was very troublesome, we could send him home just before the time for tool work! The *interest* in manual work, therefore, would be one powerful factor in getting the best type of brain activity from our pupils, and hence in really educating them.

It seems clear in every aspect that in order to get the best *intellectual* training, *manual* activity must be conjoined with so-called brain work. We do not urge hand work as an alternative or as a substitute for head work. Nor do we in the meantime urge its importance for the sake of future utility in wage-earning. We base its claims simply on the fact that through manual training you get a better intellectual training than you can possibly get without it.

The school education of every boy and girl should there-

fore consist partly of book work and partly of hand work. Regarding the book work which is desirable we need say nothing at present. It is outside our field of view, and after centuries of experience we may assume that we have already hit upon a workable scheme, though whether it is the best for modern times we may now and then have our doubts.

Regarding the best form of hand training there is more room for speculation and experiment. Hand training is yet in its infancy, one may say—has not indeed been born, as regards practical usefulness.

For the youngest children, Froebel has shown us the way to set about it, and in our kindergartens and infant schools its value is being recognised. But even there its true aim is often misunderstood. Too much care is given to the production of pretty knick-knacks, which make an attractive show at school exhibitions and in the children's homes. This is useful for awakening interest in the work, but it must not be taken as forming any part of the real end of that work. The real end is the training of the child, not the manufacture of ornaments. Still it is hopeful to see time spent in hand work, from whatever motive.

But this training is generally dropped, or practically dropped, when children leave the infant school. There is no time for it, we are told. What should we think of a workman who could not find time for sharpening his tools? or of a traveller who had no time to choose the best road? or of a water-carrier who could find no time to stop the leak in his pitcher? And every one who has studied the matter agrees that there is a very serious leakage of the instruction now given in our schools. In some cases the leakage is declared to be so great that, after a boy has been a year or two away from school, nothing remains of what we gave him except the elements of writing and a modicum of the power to read.

There are notable exceptions, too: that which remains is precisely that in learning which hand and eye were most exercised.

What should be done, then, in the common school, to secure the training which seems to be required? We can only speak tentatively, and with the uncertainty due to want of practical experience in this matter. But the experience of manual training schools, not quite elementary, in Russia, Sweden, America, and elsewhere, may guide to some extent.

We would suggest, then, that the day's work in school should consist of, say, three hours of what we may call book work, and two hours of hand work, each period being varied and divided according to the age and advancement of the pupil. The kind of hand work must be arranged also to suit the growing powers of the hand, and should never be such as to demand muscular strength beyond that of the average or even the feeble hand; for the object is not to develop muscle, but mobility, flexibility, and accuracy.

The exercises should grow out of those already in use in the infant school. Some of these, such as clay modelling, can be suited even to the most advanced pupils. In others, more refractory materials may be gradually introduced. In some quarters, as in Sweden, wood work in various forms is a favourite kind of exercise. There is the ordinary type of wood work, which may be described as very elementary carpentry, beginning with the simplest tools, and introducing others as strength and skill develop. Wood carving is another form. In American schools of a slightly higher grade turning and pattern-making follow in due course. Pattern-making, and clay modelling also, lead naturally to casting. Casting in plaster of Paris is the simplest form. Casting in metal is taken in more advanced manual training schools. Iron work of various types is suited only for older pupils. A simple form which lends itself to many artistic and useful effects, even in the hands of comparatively young pupils, is that of bent wire work. The older boys in the schools just referred to pass on to forging or blacksmith work of a simple kind; then to metal turning and various forms of what we may call engineers' work, as seen in the machine-shops of any engineering establishment.

Added to these there might be some forms of leather work and needlework. In an industrial department of a foreign mission school which lately came under my notice, tailor work was the favourite subject. This was perhaps natural, on account of its novelty; for the pupils entered as unclothed savages, and they were not sufficiently civilised to regard manual work as undignified.

Drawing should be closely connected with every form of hand work from first to last. Drawing is almost the only form of hand training which commonly finds a place in our schools at present—except that writing and figuring which is required for what we regard as education. We must also except the girls' needlework, much of which, however, is more mechanical than educative. But even our drawing is infected with the disease of abstract intellectuality. We begin with drawing lines; but we really see things first as surfaces, the line being a later abstraction. The brush should therefore come before the pencil, if we followed the natural order.

One of our leading jewellers declares that he finds the boy who has made an excellent appearance in his art examinations is practically useless to him as a draughtsman. If a customer wishes to see a design for some piece of plate or jewellery, this boy will spend hours or days in producing an accurate and elaborate series of lines; but the customer had not the advantages of a South Kensington training, and he sees things as surfaces rather than as lines. So the customer can make nothing of the drawing when he gets it. Another lad, who has no drawing certificate, will make in a few minutes a rough sketch, from which the customer can judge in a moment whether the design will suit him or not. So it would seem that even in drawing we train the eye to see and the hand to reproduce the abstract rather than the obvious and natural appearance of things.

As to the want of practical value in our drawing, I might quote the case of a good lady who was much troubled regarding her little maid-of-all-work. This girl had gained certificates and prizes for drawing, of which she was justly proud, but she never could learn to lay the cloth straight on the table.

Again, it is doubtful whether we do not transgress plain physiological laws in most of our drawing teaching still. We make drawing mainly an exercise for the fingers. But the larger muscles of the arm need training as well; and any one who has observed children must have noticed this, that command of the arm muscles comes earlier than the use of the smaller finger muscles. Hence free drawing at arm's-length is now introduced at the early stages in schools in America, and also in some English schools.

And we may note that in our drawing we train only the right hand. This means that the left side of the brain is exercised more than the right. There is really no valid reason why we should not, and many reasons why we should, exercise both hands in drawing, as we *must* do in other forms of manual work. Many of you, no doubt, are already familiar with the free-drawing exercises for both hands devised by an American teacher, and fully described in his book recently published on both sides of the Atlantic.

A vice of the opposite kind to the abstract has infected much of our wood work, so far as we have attempted it. We do not treat the wood as a material for training hand and eye, but as a material out of which things can be made. We assume that the only rational use of wood is to make wooden articles; and as the man who makes such things is the joiner or carpenter, therefore the rules and methods of ordinary carpentry must be followed, and the natural teacher of such rules is the intelligent carpenter. This is to miss the whole aim of manual training, and in this aspect the Sloyd system is infinitely superior to the amateur carpentry which takes its place in many English and Scottish schools. The material employed, be it clay, cardboard, paper, plaster of Paris, wood, or iron, is a mere matter of convenience, an accident of the course. What is essential is that we should carry on the course on educational lines, under the care of a trained teacher, who understands first the nature of the child, and afterwards the nature of the material so far as he needs to use it, and who, moreover, can connect every part of the hand work with the head work which runs parallel to it. Both should be under the control of the same teacher, to secure the unity which is indispensable.

One reason for the confusion between teaching carpentry and training the hand by wood work is probably this, that

wood is practically the only material which has as yet found its way into our senior classrooms. But if we had got the length of using all the materials I have mentioned, and perhaps others, we should at once see the absurdity of regarding these as mediums for teaching a dozen or so of trades: we should never think of employing a staff of tailors, shoemakers, blacksmiths, sculptors, iron-founders, and so forth, any more than we now regard it necessary to have professional artists to teach our school drawing. In technical schools, specialists are in their proper place. In the common school, the only specialist required is the specialist in education. The child is the unity to which all else is subordinate.

Another form of hand training is required for laboratory work—weighing, measuring, and other experiments connected with science. The experience of science teaching will show how much practice is needed to do these things even passably well. (*To be continued.*)

A FESTIVAL DAY IN BUDAPEST.

BY A SPECIAL CORRESPONDENT.

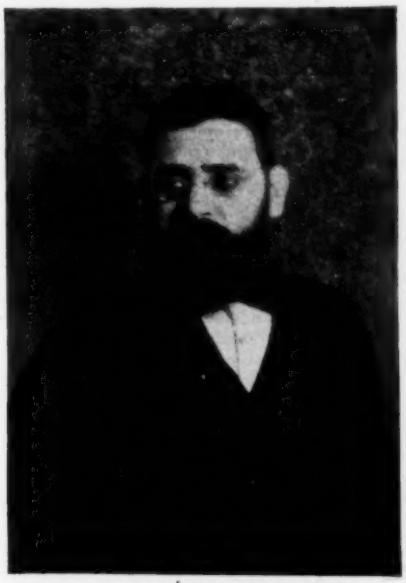
THE 8th of June is a festival day in the Hungarian schools, in order to commemorate the anniversary of the coronation of the king; and being an English visitor in Budapest, and taking the keenest interest in all things educational, I found myself invited to several of the school festivals.

I accepted as many as I could, and at eight o'clock in the morning I was wending my way through the interesting streets, with unpronounceable names, to the Boys' Gymnasium, where the scholars were celebrating the day with music, speeches, and recitations. I had to linger on the way for my breakfast, and I stepped into one of the many shaded recesses shut off from the road by a screen of greenery, and drank such coffee as only the Hungarians can make. My escort met me there, and took me through a bewildering maze of streets to the school.

It was a huge building, with many stone steps and wide corridors. The bustle showed that something unusual was going on; boys in white gloves and festival manners stood about, showing us where to go; and many fashionable ladies and dignified gentlemen were on their way to the great hall upstairs, which was already filled with parents, sisters, friends, and members of the committee. I was introduced to many people, among whom was a French professor who was studying schools in Hungary. The first item on the programme was the singing of the king's hymn by the pupils; then a handsome boy recited a poem in honour of the king. The third item was an overture from Mendelssohn, played by the string band, which was comprised of boys from the upper forms. All Hungarians are born musicians, as they are born orators, and it was interesting to watch the members of the band during the performance. The boys' ages varied from perhaps fifteen to eighteen, and it was easy to observe the various types—the slight, active, brown-faced boy, with all the romantic melancholy of the Hungarian in his eyes, and the thick-set, heavier type, with the square jaw, and eyes full of restlessness. It was not difficult to distinguish many Jewish boys among the gathering: the characteristic features, luminous eyes, and eager alertness stamp the type everywhere. There were flute and violin solos; strange, sad gipsy dances and marches; a declamation from a poetic-looking boy with wild eyes; and a recitation, "God help the nation," by a boy with a clear, thrilling voice, which made one wish to understand the beautiful and musical Hungarian language.

DR. VERÈDY.

When the national hymn was sung I had to take my leave, for I was due at another gathering at half-past eleven. This was an assembly of teachers, inspectors, and others in the Teachers' Casino to meet the Minister of Education.



DR. WALDAPFEL.

The Teachers' Casino owes its origin chiefly to Dr. Verèdy, the Chief Inspector of Public Instruction in Budapest. It consists of dining-rooms, library, reading-room, billiard-room, ladies' drawing-room, and kitchens and offices. The object is to provide a means of social intercourse among the Budapest teachers. Teachers of all grades and ranks meet here, and a good dinner is daily served at a moderate rate.

The gathering was intensely interesting. I was introduced to teachers of all sorts and conditions. Here was a Scotch clergyman who was running a mission school in Budapest, and there was a professor of pedagogy who was training university men for secondary school work. There were a number of ladies, who are well represented in the elementary and other schools. When the minister arrived the Hungarians stood up and cheered him, and then the speeches began. Dr. Verèdy presided. I was sorry not to be able to understand the speeches, which seemed to excite so much enthusiasm. They appeared to be about the new library at the Casino, the king, and the minister, and education generally. Presently I caught the word *Angol* (England), which was received with wild cries of *Elyen* (Long live), and then I became conscious that I was being welcomed to the city and received as an educational colleague. The charming things that were said about the greatness and nobility of the English nation were very gratifying. Later some prizes and scholarships were awarded to poor scholars, and then we broke up into little groups to talk. The minister discussed English education with me in the German language: all educated Hungarians speak German. Then the ladies carried me off to their drawing-room, and I began my acquaintance with a charming Hungarian woman, who helped to make the rest of my stay in Budapest very pleasant. At two o'clock there was a banquet, at which some half-dozen ladies were present. I discovered that I was the distinguished guest of the occasion, and I found myself placed at the president's right hand at the top table.

It was all very novel, very interesting, and very delightful, and the toasts which were drunk afterwards called forth many lively speeches. The King, the Minister of Education, and THE PRACTICAL TEACHER's Special Correspondent were toasted amid wild cheers.

I became conscious that the president was proposing a toast to the English guest before he broke out into German;

but when he spoke in a tongue I could comprehend, I blushed at the high compliments he paid to English education and the English nation.

Then everybody clinked glasses with me and said *Élyen Angol*, and I picked up the phrase and said *Élyen Ungarn*. Among the many charming speeches which followed, there was one from a schoolmaster which pleased everybody so much that I got my kind Hungarian lady to translate some of the phrases for me. He said he had two English children in his school, who, though they were Hungarian in their speech, were English in their hearts. He enlarged on the freedom of England, and said that he would like to say all the English words he knew for the benefit of the English guest. "Good-morning," "Good-bye," "How do you do?" "One, two, three, four," appeared to be the extent of his English vocabulary. We met afterwards, and managed to exchange some ideas in spite of the language difficulty. It was a pretty festival, and one felt warmed by the heartiness of the Hungarian welcome. I was regarded as a member of the Casino after that, and I used it as a kind of home.

But I had yet another festival to live through before the day was over. Dr. Waldapfel, Professor of Pedagogy, took me miles away to the wonderful hills beyond Buda, where the girls of the gymnasium were holding their revels. We sat under the acacia trees, drank coffee and chocolate, and ate eggs and rolls; and all the merry bonnie girls buzzed around, chatting, playing, and arranging the flowers they had gathered in the woods and on the hills. I do not think that I ever in my life made so many friends in one day as I did on that wonderful day of the king's coronation in Budapest.

ROYAL COLLEGE OF SCIENCE.

PART II.

IN our last article we spoke of the mechanical laboratory, or, rather, of that part of it which is contained within the college proper; for it will be remembered that the wants have long outgrown the accommodation, and part of the Indian Museum has long been annexed in order to provide classrooms for the ever-increasing number of students. The result is much inconvenience and a certain amount of confusion. For example, the drawing-room, which is so necessary a part of the mechanical division, and which ought to be in close connection with the mechanical laboratory, has to be sought on the other side of the road. Here excellent drawing-tables have been provided; but the room itself is a sorry makeshift, and it is no wonder that Professor Perry complains of his accommodation. In the main building itself are located the three chemical laboratories—north, east, and south—the biological laboratory, part of the physical laboratory, the lecture theatres for chemistry and physics, and, in the basement, the metallurgical laboratory.

The chemical laboratories are very inferior to those that are found in modern polytechnics; indeed, some of the benches have been placed in corridors, so great is the overflow of students. In one of the balance-rooms we saw a device for preventing the loss of the weights which is worth noticing. A slab of glass, painted white on the underneath surface, is placed along the edge of the bench, and any weights falling upon this are readily seen, and so are prevented from being unconsciously swept upon the floor. In one of the laboratories we found Mr. Chapman Jones, the senior demonstrator, to whom the students are indebted, not only for their instruction in qualitative and quantitative work, but also for much useful tuition in photographic manipulation, in which Mr. Jones is an acknowledged expert.

In the chemical laboratories is exhibited a notice to the effect that gratuitous instruction in French and German is offered to all students who may care to avail themselves of it.

The Huxley Memorial Laboratory, with its imposing array of saurians, is a sight worth seeing. Two research students are accommodated here; and it may here be remarked that research work is a feature in all the sections of the college, and many are the memoirs presented to the learned societies by professors, demonstrators, and students during the year.

The mining section of the college is entirely in the Indian Museum. Here we saw some excellent diagrams, all of which had been prepared by the students themselves, who are required to spend a certain portion of their time in the inspection of actual mines, sometimes at home and sometimes on the Continent. The students are called upon to give an account, both in writing and, more especially, by drawings, of what they have learned in this practical way.

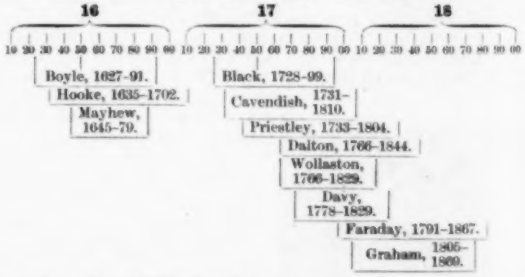
The electrical laboratory is a long, gloomy building, well stocked, however, with a wealth of up-to-date apparatus, much of which is home-made.

The geological laboratory is again remote from the main building, although situated on the same side of the road. A private house has been acquired, out of which has been extemporised a laboratory; so that here again it may be said that the equipment is just as excellent as the building is inconvenient and mediocre. The Professor of Geology is Professor Judd, C.B., F.R.S., who is also the Dean of the College, which position he succeeded to upon the decease of Professor Huxley. Like all the other professors, the Dean rejoices that the Council of the College has received assurances of the intention of the Government to erect suitable laboratories for carrying on the instruction, whilst, however, complaining "that until the building operations are actually completed, the existing conditions of inconvenience and overcrowding must continue." We can bear witness to the truth of this complaint, even from our cursory visit; and it is to be hoped, for the credit of the nation, that such provision of accommodation will be made as will be creditable to a Great Power.

The solar physics laboratory, which is also in what may be termed the Indian Museum section of the college, is dealt with in another place, so that we may dismiss it with the remark that the buildings are truly insignificant, when the importance of the work is considered.

In addition to the ordinary work of the college and the summer courses for teachers, evening lectures are given to working-men.

In the session 1897–8 three such courses were given, namely—(1) The Kinship of the Vertebrata, by Professor Howes, which was attended by 261 people; (2) Prospecting, or How Minerals are Discovered, by Professor Le Neve Foster, the number present being 292; and (3) Discoveries in Chemistry, 1837 to 1897, by Professor Tilden, attended by 172. It may be remarked in passing that Professor Tilden evidently attaches very great importance to historical chemistry. On the board of the lecture theatre, when we visited it, was the table of which the following is a part, and which will be found in its entirety in Professor Tilden's *Hints on the Teaching of Elementary Chemistry*:—



It is a pity that the professor does not cut out some of the bodies from the advanced stage of theoretical chemistry and substitute a certain section of historical chemistry, especially as he finds this branch of the subject suitable both to his own students and to artisans.

We have mentioned the fact that underground study is insisted upon in the case of mining students; we also learned that the students of mining, metallurgy, and geology make visits of instruction to works and districts in order that they may study their subjects more effectually. The curious reader will find particulars of these visits in the Forty-sixth Report of the Department of Science and Art. The course of instruction lasts three years. During the first year all students take the same course, which is as follows:—*First term*—chemistry, mathematics, and model and freehand drawing. *Second term*—physics, mathematics, and model

and freehand drawing. In the second and third years there are five divisions for science, namely—(1) mechanics, (2) physics, (3) chemistry, (4) biology, (5) geology; and two for mining—to wit, (1) metallurgy, (2) mining. A candidate for the title or degree of A.R.C.S. (Associate of the Royal College of Science) must pass in one or more of the first-named five subjects; whilst a candidate for the title of A.R.S.M. (Associate of the Royal School of Mines) must pass in one or other of the two last-named subjects. Although the syllabuses are not made to coincide with those of London University, the Council are justly proud of the fact that a large proportion of the first classes and honours at the London B.Sc. are obtained by the students of the Royal College of Science. In 1897–8 the proportion was between a third and a half, and several of the students and professors have obtained the D.Sc. degree of London.

What becomes of these scientists who have been so carefully trained at the expense of the nation? The answer is a very satisfactory one. The college is mainly intended to train teachers, and it is to teaching that the greater number gravitate. This is made clear by Professor Rücker with respect to the physics section, and what applies there obtains with a greater or a lesser extent all round. He obtained particulars as to the careers of forty-one out of forty-seven who had gained the Associateship in Physics during the five years preceding his report. These are as follows:—

Engaged in or preparing for educational work	27
Occupying posts in which a knowledge of science is important	5
Engaged in commercial work	8
	40

Of those in the first group, four have gone to Cambridge. Three of these gained scholarships in physics at Trinity College, of whom two are still undergraduates. The third (Mr. G. W. Walker) graduated as Fourth Wrangler, and subsequently passed in the first division of the first class in the second stage of the Mathematical Tripos.

The name of the fourth of these students, Mr. J. H. Vincent, appeared in the last report as the author of two papers describing investigations carried on by him in the Royal College of Science. On leaving the college he entered the Cavendish Laboratory of the University of Cambridge as a post-graduate or research student, and in the course of the year obtained the D.Sc. degree of the University of London.

Other students included in the first group are at present teaching in the Yorkshire College, Leeds; University College, Nottingham; the Central Technical Institute (two); the Battersea Polytechnic (two); the Engineering College, Portsmouth; the Huddersfield, Halifax, and Leyton Technical Schools; the West Ham Polytechnic; the Jarrow Higher Grade School; the Allen Glen College, Glasgow, and similar institutions. One has obtained a permanent post in the Royal College of Science, and six are passing through a two years' course of teaching in our laboratories as teachers in training.

Of the five students placed in the second group, two have gained places in the Patent Office, two are Factory Inspectors, and one is engaged in the Science Museum of the Department.

From the above statistics it appears that about seventy per cent. of the successful candidates for the Associateship in Physics become teachers of science.

With this gratifying analysis we will take our leave of the Royal College of Science, hoping that the only weakness—namely, the want of proper buildings—will ere long become the conspicuous strong point of a most deserving national institute.

INTERNATIONAL CORRESPONDENCE FOR PRACTICAL TEACHERS.

OUR friend M. Mieille sends us the following letter, which he has recently addressed to the Rector of the Tarbes University in the Pyrenees:—

"A Monsieur le Recteur de l'Université de Tarbes.

"MONSIEUR LE RECTEUR,—J'ose me permettre de venir solliciter votre bienveillant appui et votre précieux concours en faveur d'une œuvre scolaire dont l'Université a pu déjà apprécier le mérite et que le public des Pères de famille, clients de l'Université, a favorablement accueillie.

"Il s'agit de la Correspondance scolaire internationale.

"Comme vous ne l'ignorez pas, sans doute, Monsieur le Recteur, c'est en janvier 1897 que j'ai pu avec le concours de plusieurs éminents publicistes et professeurs, français et étrangers, Max Leclerc et Armand Colin de la *Revue Universitaire*, Stead de la *Review of Reviews*, Scheurmier du PRACTICAL TEACHER, F. Buisson du *Manuel général de l'Instruction publique*, E. Moneta et le Docteur A. Tassoni de la *Vita Internazionale* de Milan, le Docteur Hartmann de Leipzig, le Professeur Magill de Boston, etc., etc., organiser ce vaste système de correspondance entre écoliers français et étrangers qu'on a baptisé plus tard l'Internationale scolaire ou plus brièvement encore l'I.C.

"Je crois de mon devoir d'ajouter que, dès le début, j'ai été chaudement encouragé par mes chefs; je suis particulièrement heureux de rappeler le bienveillant accueil et le précieux appui moral de Monsieur le Recteur de l'Académie d'Aix et de MM. les Inspecteurs généraux des langues vivantes. Tout dernièrement encore Monsieur le Recteur de l'Académie de Toulouse a bien voulu m'exprimer tout l'intérêt qu'il ne cessait pas de prendre au succès de la I.C. et des Echanges interscolaires.

"Après trois ans d'existence on peut dire que la Correspondance scolaire internationale ou I.C. a fait ses preuves. Sans avoir réalisé encore les merveilleuses destinées qu'on lui prédisait, l'I.C. a fait modestement son chemin, et les quelques critiques qu'elle avait suscitées au début n'ont pas résisté à la logique des faits ni à l'éloquence des chiffres. Plus de dix mille correspondants—j'évalue au plus bas—échangeant 20,000 lettres par mois et plus de 300,000 par an sont la preuve irréfutable que la I.C. est entrée définitivement dans le domaine des faits.

"La majorité des professeurs de langues vivantes en ont vite apprécié les avantages pratiques, et en ont fait, comme l'avaient souhaité les fondateurs, un usage méthodique et réglé dans leur enseignement.

"Mais trop nombreux encore sont ceux qui, soit par routine, soit par timidité et par crainte d'imaginaires complications, hésitent à se servir du puissant adjuvant que la I.C. met à leur portée.

"Et c'est à votre haute influence, Monsieur le Recteur, que je me permets de venir faire appel, pour vaincre ces dernières résistances et rassurer ces persistantes timidités.

"Je me rends parfaitement compte combien la démarche que vient tenter auprès de vous l'humble professeur que je suis pourra paraître inusitée, peut-être même indiscrète; mais j'ose compter sur votre bienveillante indulgence en faveur du motif qui m'anime, et je vous adresserai la prière qui est l'objet de ma lettre.

"Je viens vous prier, Monsieur le Recteur, de vouloir bien, au début de cette année scolaire, recommander très chaudement la pratique de la Correspondance scolaire internationale aux Professeurs de langues vivantes de votre Académie.

"A la veille de l'Exposition de 1900 les relations entre jeunes français et étrangers ne sauraient être trop nombreuses; plus que jamais il est évident qu'en aidant à répandre le français, on sert la France, et la Correspondance, tout le monde en tombe d'accord, est un excellent moyen de faire aimer la France et les Français.

"De même je vous serais très reconnaissant de recommander les Echanges scolaires pour les vacances.

"Les Professeurs de langues vivantes, en favorisant, en faisant naître au besoin, le goût des voyages et le prosélytisme de la langue chez leurs élèves, peuvent servir très efficacement leur pays.

"J'oserai ajouter une dernière requête:—

"A côté de la I.C. s'est créée la *Correspondance pédagogique internationale*, ou l'Inter-Teacher comme l'a justement baptisée Mr. Scheurmier, l'éditeur du PRACTICAL TEACHER de Londres. Des pédagogues aussi éminents que M. F. Buisson s'en sont fait les champions dévoués. Le Manuel général et le Volume ont déjà publié de nombreuses listes de Correspondants. Ajouterai-je beaucoup à mon indiscrétion, Monsieur le Recteur, en vous priant d'insister auprès de MM. les Inspecteurs d'Académie de votre ressort, pour qu'ils engagent leurs jeunes Instituteurs à se faire inscrire à l'Inter-Teacher?

"Les inscriptions pour les correspondances anglaise et allemande sont toujours reçues par la Revue Universitaire.

"Je les reçois pour la Correspondance italienne, et de plus, je me tiens à la disposition de tous mes collègues pour tous détails et renseignements.

"J'ai l'honneur de vous prier d'agréer, Monsieur le Recteur, l'assurance de mon respectueux dévouement et de ma vive reconnaissance. P. MIEILLE.

"*Professeur d'anglais au Lycée de Tarbes.*"

[*It is hardly necessary to mention that no charge is involved in connection with the Scheme of International Correspondence. A new list of names is now ready to go to Paris, and any of our readers who may wish to be included are invited to send their names and addresses to the office of this journal.*—ED.]

Our Monthly Retrospect

EDUCATION IN ENGLAND.

N.U.T. NOTES, ETC.

BY T. B. ELLERY, F.R.G.S.,

President of the National Union of Teachers, 1895-96.

The Teaching of Practical Agriculture. The proposal to make the teaching of practical agriculture compulsory in rural schools will be met with considerable opposition. Some at least of those who are pushing the proposal forward appear to think there is no such thing as an overcrowded curriculum at the present moment; that the subject can be introduced without further financial support; that the present staff is quite capable of doing the extra work; and that the teaching will have the effect of keeping the children upon the land, thus preventing the migration from village to town which is undoubtedly fast becoming a serious matter for agriculturalists throughout the country. But is the proposal likely to do any real good? Is not "The Agricultural Education Committee" beginning at the wrong end when it suggests additional work but no additional funds? Mr. H. Hobhouse, M.P., sees no difficulty; but Sir William Hart-Dyke declares that the financial difficulty is the first thing to be faced. And so says every one who really knows anything of the conditions under which rural schools work.

Something to be Dropped. Sir John Lubbock says the expense of this agricultural experiment need not be at all great; and as to finding room for the subject on the time-table, he is prepared to take time from *arithmetic* and English grammar! Too much time is given to these subjects! It would be interesting to note how many of Her Majesty's Inspectors agree with Sir John. No practical teacher will be found on his side so far as arithmetic is concerned—that is quite certain. The thanks of the profession are due to Dr. Macnamara for the energetic way in which he is fighting this proposal. His letter to Mr. Hobhouse is distinctly good. Our rural friends need be under no apprehension at present; for *The Times* says the question of teaching staff stands in the way, and thinks it rather premature to insist upon this compulsory teaching without taking steps to secure increased pecuniary aid for small and struggling schools, and *The Birmingham Daily Gazette* declares that the scheme is impossible in any shape or form without increased monetary assistance. Surely it will not be difficult to convince the Government that the existing staff cannot possibly undertake the proposed new duties; that there is no time for the work; that arithmetic, at any rate, must not suffer; and that if rural schools are to render really effective service to the State (altogether apart from this question of agriculture), there must be a sensible addition to the income.

The N.U.T. Executive on the Question. When this subject of Practical Agriculture was introduced by Dr. Macnamara, at a meeting of the Executive on Saturday, November 5, some capital speeches were made, notably by the doctor himself, Mr. R. R. C. Gregory, Mr. Graves, and Mr. Coward. The following resolution was carried unanimously:—

"That strong representations be at once made to the Education Department in opposition to such a proposal, unless as preliminary conditions to the change suggested—

"(*a*) The rural schools are furnished with far greater financial support than at present.

"(*b*) The head teachers are relieved of their present unfair burdens by the appointment of effective adult assistance.

"(*c*) Any fresh subject be treated as wholly substitutional to some one or more of the existing subjects in an already overcrowded curriculum."

At the same meeting a deputation to the Education Department was appointed, consisting of the officers, Miss Selvage, Dr. Macnamara, Mr. Wild, and Mr. Graves, the last-mentioned being able to speak with forty years' experience in truly rural schools. By the way, members of the N.U.T. will be sorry to hear of the veteran's contemplated retirement from the Executive of the N.U.T. He has served on that body for thirty years, and now feels he is physically unable to continue at his post. If any man ever deserved well of his fellows, that man is J. J. Graves. May the evening of his life be peaceful and pleasant!

The Merthyr Conference of Class Teachers. Wales received its first visit from the National Federation of Assistant Teachers on the last Friday and Saturday in October, and right well did the good people of Merthyr rise to the occasion. The Federation is now seven thousand strong, a very large number of whom are also members of the N.U.T.; and the president is Mr. J. E. Holden, an exceedingly able man, and a member of the Executive of the Union. All who know Mr. Holden are confident that the reins could not have been placed in more skilful hands. His presidential address was one of the shortest on record, but it was typical of the man and his usual utterances in that it was "pithy, pointed, and practical." It seems scant courtesy to extract a few points from this address and give them only, but it is impossible to give the whole. Said Mr. Holden:—

"1. Last year there were 94 children for every certificated teacher, the number varying in localities from 48 under the London School Board to 184 in South Shields.

"2. A Government return shows that, out of 137,315 boys leaving school to follow known occupations, only 1,107—that is, 8 out of 1,000—become teachers. The number of boy pupil-teachers is practically the same to-day as in 1870. It is 4,000 fewer than in 1877.

"3. Three years ago this organisation (the National Federation of Assistant Teachers) had twelve persons as officers and committee. Of these, seven are no longer working as assistants in elementary schools. They have become commercial travellers and secretaries of various organisations. During the six years since our formation only one of our committee has been appointed to a headship of an elementary school. The conviction is being borne home to the teacher that the best way is the 'way out.'

"4. Since 1876, the 20,782 head-teachers then existing have become 30,911 to-day, an increase of 53 per cent. The 2,271 certificated assistants of 1876 have become 28,963 to-day, an increase of 1,130 per cent., or twenty times the proportionate rate of the head-teachers."

The Assistants' Questions. Among the topics discussed were "Salaries of Class Teachers," "Confidential Reports and Log-Book Entries," and "Large Schools and Classes." Miss Lane introduced the first mentioned, declaring that the scale of £70 to £90 given to class mistresses at Merthyr was disgraceful. Another speaker, Mr. W. C. Jenkins, of Swansea, a former member of the N.U.T. Executive, announced, amidst loud shouts of "Shame!" that at Gellygaer the assistants received a fixed salary of £70 a year. Mr. Stanniforth, of Cardiff, said the Cardiff assistants were in a somewhat better position than that, as they received increments of £10 a year up to a maximum of £140.

The great majority of the members of the Union will agree with Mr. Boulter's contention as to confidential reports and log-book entries. There should be confidence all round, and this is impossible while head teachers are required by

School Boards to furnish "confidential" reports month by month as to the work of individual teachers.

Those affected by these reports should surely see what is said, in order that they may be in a position to answer any reflection or charge that may be brought forward in those reports.

And the same may be said with respect to log-book entries. If heads and assistants are to work in harmony, and in the best interests of the children, there must be nothing concealed. A head teacher may be compelled, of course, from a sense of duty, to report adversely upon an assistant's work; but he should in every case give the one concerned the fullest information. To the credit of the profession, be it said, there are very few indeed who do not treat their assistants with courtesy and fair play in this particular, as in others.

On the subject of *large schools*, opinions will differ. The Conference agreed that no department of a school should be built with accommodation for more than three hundred children, and there is much to be said in favour of the proposal. But there is another side to the question, of course, which must not be lost sight of.

There will be no two opinions as to large classes, however. No teacher ought to be either directly or indirectly responsible for more than forty children.

Officers for 1899-1900. There were two competitors for the vice-presidency—Mr. Carr, of Bradford, and Mr. Ruse, of Plymouth. The latter was elected by a very large majority. Messrs. Allen Croft and J. T. Boulter were re-elected hon. treasurer and hon. secretary respectively; and the committee will consist of the following: Miss Lane, Mr. G. W. Carr, Mr. J. J. Cullum, Mr. W. Goldstone, and Mr. E. Williams. No Association having sent an invitation, it is not yet known where next year's Conference will be held, but Oldham has been mentioned in this connection.

In conclusion, a word of congratulation to the assistants upon the great success attending the Merthyr meeting, and to Mr. Ruse upon his election to the chair. He is certain to give a good account of himself.

The Teachers' Benevolent and Orphan Funds. It is believed that teachers in all parts of the country are becoming alive to their responsibilities in the matter of these funds. The opening of the new boys' home has done much to create a spirit of enthusiasm in districts where little or nothing has been done in the past. Nor is this spirit being created a day too soon. There are over 40,000 members of the N.U.T., out of 60,000 certificated teachers in the country, but the number of those who subscribe five shillings or more per annum falls below 19,000. On many occasions the apathy of the majority has been referred to in these columns. Let us hope that apathy will give place to interest, and lukewarmness to enthusiasm. After the magnificent example set by the London teachers, the provinces must see that the proper support is given, and that the committees responsible for the administration of the funds are not worried and harassed by the knowledge that they cannot do all they would do in alleviating distress. There is no question that, unless a substantial improvement sets in, the committee will be compelled to make smaller grants and adopt fewer cases. Of course *the first to suffer will be the non-subscriber to the funds.* It is simply astonishing, after all these years, to find non-subscriber after non-subscriber appealing for assistance. Isn't it really extraordinary that they never hear of the existence of the funds until the hour of need?

The Union's Ancillary Scheme. After many conferences between representatives of the Executive and of the Teachers' Provident Society, communications with the actuary, and a close study of all the conditions surrounding the subject, the Superannuation Committee submitted to the Executive, at its meeting on the 5th of November, certain schemes and tables upon which will be based the Union's ancillary proposals in connection with the Superannuation Act of 1898. One of the features of that Act is that should a teacher die before the pension age (sixty-five) is reached, every payment made by the said teacher is lost so far as his relatives are concerned, for there is to be no return of premiums. Every one admits the hardship of this; but to ensure the return meant a very much higher annual premium than at present, and a considerable falling off in the pension benefits at sixty-five. The Executive, therefore, has done its best to meet the case by devising a scheme which will provide for the return of premiums. Having made up its mind what it wanted, it looked round to see what societies would be likely to undertake the work, and on what terms. Some suggested that the Union should carry out the scheme itself, but those who have looked closely into the whole question recognise that this is impossible. The Teachers' Provident Society and certain other life assurance societies were approached, and finally the correspondence and proposals of the various societies were submitted to the Executive. There was a discussion as to the management fee suggested by the Provident, it being generally felt that a lower figure could with safety be charged. Subject to this lower figure being conceded, the Teachers' Provident was selected to carry out the scheme on behalf of the Union.

Some Particulars as to the Scheme. Under the tables which have been more particularly under the careful examination of the committee, there is to be a return of premiums in the event of death before the pension age is reached, but no return if the pension age is reached. One of these tables provides for the return of the annual contribution to the Superannuation Fund, and another for the return of this contribution *plus* the premium paid to the Union's Ancillary Scheme. The latter is known to those most intimately associated with the preparation of the facts and figures as Table II. (A).

It would scarcely be wise, perhaps, to give the tables at this moment, for they must be carefully examined by the Board of the Teachers' Provident Society before they can be finally adopted. It may be said now, however, that they are calculated up to fifty years of age only; but it is agreed that the Board shall acquire power to accept existing teachers up to sixty-five years of age, provided they join within a given time. Other interesting features are:—

1. In the event of a member leaving the profession and the society before reaching the age of fifty, eighty per cent. of the premiums paid under this table will be returned.

2. The Provident Society's admission fee of 2s. 6d. will be remitted in the case of—

   (*a*) Existing teachers who join within six months from the date of the scheme coming into operation; and

   (*b*) Future teachers who join within six months after passing the certificate examination.

3. The Committee of Management will consist of an equal number of members of the Board of Management of the Teachers' Provident Society, and of members of the Executive of the N.U.T. elected by the Executive.

4. The Board will accept a general declaration of health at admission in lieu of a medical examination.

It may be, of course, that members of the Union, after due consideration, may refuse to join this fund for the return of premiums. The scheme may appear, at first sight, expensive; but teachers may rest assured that the figures quoted are the *lowest possible.* That being so, those for whom all this work has been done should think twice before they reject such an important and valuable scheme of insurance.

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TECHNICAL AND SECONDARY EDUCATION.

Returns by County Councils. A very valuable because authentic return has just been issued by the County Councils Association. It gives a more detailed and classified account of the aid rendered by the County Councils to technical and secondary education than has yet been published. With the exception of Cornwall, Huntingdonshire, and Buckinghamshire, which either do not belong to the Association or which have independent committees dealing with the distribution of the money, the returns for the counties are complete, and it is now possible at a glance to see what are the various directions in which the money which may be devoted to technical education is expended. Owing to the difference of administration under the Welsh Intermediate Education Act, it has not been found possible to include statistics from the Welsh counties. The county boroughs are not included, but it is satisfactory to know that they are all devoting the whole or a part of their customs and excise money to education.

How the Money goes. It is satisfactory to note that of the forty-three county divisions (several counties have more than one division) sending returns, six only appropriated any appreciable amount, less than the grant received from the Local Taxation (Customs and Excise) Act during the year, to other purposes than education, while several spent more on education than the sums so obtained. The administration of the money is not entirely retained by the County Councils, more than one-half of the number handing over a proportion to urban authorities to administer. The aid given to secondary schools is of two kinds—direct and indirect. The direct aid consists of grants for maintenance and teaching staff, and of expenditure for buildings and equipments. The indirect aid is in the form of scholarships and exhibitions tenable at the schools. A second part of the money is devoted to evening continuation schools, whether connected with the Education Department or not. In addition, aid is given to special classes for elementary teachers, to university colleges, and to the granting of scholarships to such colleges. In return for the aid granted to endowed schools, thirty-one of the counties appoint representatives on the governing bodies of such schools, while eleven are without such representation. None of the counties making returns (thirty-nine) levy a general rate for technical or secondary education, although in a few instances rates are levied over special areas for special purposes, and loans on the security of the rates have been made to the Technical Education Committees. Twelve of the counties have made grants to meet rates made by other authorities.

Aid to Secondary Schools. The direct aid to secondary schools during 1897–8 applied to maintenance and teaching staff amounted to £28,414; while during the last seven years a sum of £75,274 has been expended on buildings and equipment. Surrey and the West Riding of Yorkshire are the two divisions which have been most liberal in their aid to secondary schools. The indirect aid consisted of some 2,608 scholarships tenable at secondary schools of a total value of £32,452. The number of pupils under instruction in these secondary schools is approximately 30,000. When it is remembered that over 600,000 pupils were returned as being educated in secondary schools of all kinds, and that the whole sum available for distribution by the County Councils under consideration was £418,000, it cannot be said that they have erred greatly in making such grants, especially as much of the money given directly has been used for improving the technical side of the schools, and in the provision of such rooms as will enable teaching to be given preparatory to specialisation in technical work. At the same time, it will be necessary to guard against much extension of this kind of aid if technical instruction proper is not to suffer.

Aid to Evening Continuation Schools. Thirty-seven of these counties give aid to evening continuation schools, the aid granted being, with the exception of some £3,200, allotted to classes in schools in connection with the Education Department in such subjects as come within the province of Technical Education Committees. The total amount used for evening continuation schools in 1897–8 was £28,160, or almost exactly the same as was given for the maintenance of secondary schools; the number of schools thus aided was upwards of 2,100, and the number of scholars in those schools upwards of 100,000. The increase of scholars in the evening continuation schools during the past few years seems to point to the fact that increased openings for the distribution of aid will be found in the near future.

Aid to Classes for Teachers and to University Education. It cannot be said that either the County Councils or the teachers have failed to respond to the demand by the people for higher education, especially of a technical kind. Most of the County Councils have established special classes for teachers, and during the past year upwards of three thousand teachers were found regularly giving up their leisure time to attend classes in art, science, wood work, and other technical subjects. The County Councils have responded by meeting the expenses of the classes, and paying railway fares to the extent of nearly £10,000. Each of the local university colleges has received some aid, and upwards of three hundred university scholarships have been founded.

General. It is impossible in a general way to summarise the answers to questions illustrative of the aid given to schools of science and art, technical institutions, agricultural schools and institutes, and day schools giving instruction in agricultural, commercial, domestic, manual or technological subjects; but the answers show that scarcely any branch of technological work has been left unaided. It is, however, perfectly clear that agriculture, as the industry employing the largest number of people, has not been neglected. A large number of scholarships, in addition to those directly held at secondary day schools, have been granted in mining, dairying, horticulture, poultry-keeping, domestic economy, nursing, science, art, music, and in commercial, nautical, and other subjects. Examinations are held by various authorities, and by the inspectors or organising secretaries of the councils, so that there are few schools or classes which have not periodically applied to them the tests of inspection and examination necessary to ascertain their efficiency in a greater or less degree, and so give a guarantee for the due and proper expenditure of public moneys. When it is remembered that the whole scheme of technical instruction in this country has had to be built up during the last ten years, and that all the instruction in science and art under public auspices has taken place since 1851, great cause for satisfaction may be expressed. If proportionate progress is made during the next generation under the newly constituted Education Board, our country will be second to none in the world in the provision it makes for technical education.

The London Technical Education Board. *The London Technical Education Gazette* double number for September and October contains a list of evening classes conducted by the Technical Education Board in science, engineering, and trades. It may be mentioned that these are now so numerous that the list occupies no less than seventy-four foolscap pages. There is no district of the metropolis uncovered, and there is no subject of instruction required by ordinary individuals which is unprovided for. No town in Europe can boast of such facilities for evening class work. With the continued expansion of polytechnic work, the field for technical education will soon be entirely covered.

Higher-Grade Schools. The address of Mr. Dyche, B.A., of Halifax, the new president of the Association of Head-masters of Higher-Grade Schools and Schools of Science, delivered at the annual meeting held in the Society of Arts Rooms, John Street, W.C., on November 2, 1899, was a very careful and moderate statement of the history and the claims of these institutions to recognition in any scheme of national education. It clearly showed that they were an organic outgrowth of the elementary school system, and that their foundation was largely due to the fostering care of the Science and Art Department, and a legitimate termination to an elementary school course. Their efficiency had been limited by the system of paying grants on individual passes,

but had been partially removed by the revised curriculum introduced by Mr. Acland in 1895. When complaints were made by the secondary school teachers that these schools encroached on the province of the secondary school, a concordat was arrived at by representatives of both classes of schools at a conference presided over by Sir George Kekewich, and the province of each school more accurately defined, so as to remove causes of friction. In discussing the present condition of these schools, Mr. Dyche showed that they are taught by trained teachers, a very large proportion of whom are also graduates; that their discipline is admirable, and their curriculum free from complication; that the system of admission to them is not injurious to elementary schools; and that the training they give admirably fits boys to receive higher technical instruction at technical colleges and universities. Of their defects, the abnormal size of classes, the insufficient salaries of assistant teachers, and the shortness of the holidays were enumerated, none of which could be well remedied till the position of these schools was thoroughly and financially settled. Of the vacillating action of the Science and Art Department towards them during the past few years Mr. Dyche spoke in terms of strong condemnation, and insisted that the time had arrived for the legalisation of their position while maintaining their integrity. A profitable discussion followed the address. Among the visitors present were Messrs. Sadler, Morant, and Buckmaster of the Education Department, Mr. Bond, M.P., Dr. Garnet and Mr. James of the London Technical Education Board, Dr. Macnamara and Mr. Bowden of the London School Board, and Mr. Yoxall, M.P., and many members of the Executive of the N.U.T.

The Associated Chambers of Commerce and Modern Languages. A deputation waited upon Sir John Gorst on 27th October, to ask for special payments for the teaching of modern languages in schools; but although the vice-president received them sympathetically, and extolled the value of such teaching, he pointed out that developments in the future under the Education Board might be expected, so that special grants would be done away with and help given for such a curriculum as the wisdom of the new local authorities might adopt, with the consent and approval of the Board. There would, therefore, appear to be little likelihood of any stereotyped system of instruction being forced upon secondary schools, as many secondary teachers have feared. Freedom, variety, and elasticity are to be the guiding principles under which they are to be conducted.

Items. A voluntary concordat has been entered into by representatives of the Bristol School Board, the Merchant Venturers' Technical College, the School of Art, and University College, for the co-ordination of evening class work in Bristol, the whole of the institutions working under it during the present session.

Earl Spenser, speaking at Birmingham on 27th October, contrasted the payments on behalf of education in America with those in this country, but spoke very hopefully of the progress we are making. He stated that he should not be satisfied till there was a perfect flow from the lower to the higher classes of schools.

Miss Kitty Isaacs, L.L.A., an assistant teacher, has been chosen by the London School Board to hold a Travelling Scholarship of £120 for the next ten months. She will study educational methods in Germany.

The teaching of Science was one of the subjects discussed at a conference held in connection with the London School Board Exhibition of Hand Work held in the Examination Halls, Victoria Embankment, on the 15th, 16th, and 17th November.

EDUCATION IN SCOTLAND.

E.I.S. NOTES, ETC.

BY JAMES PATERSON,

Ex-Vice-President of the Educational Institute of Scotland.

Dundee Branch, E.I.S. THERE was a large attendance at the meeting of the Dundee Branch of the E.I.S. to hear a paper by the Rev. Dr. Danson, Aberdeen, on "The Cultivation of the Imagination." Both in preaching and in teaching, the lecturer said, too little use was made of the imagination. In speaking of history, as the best plot in which to set the productive fancy to work, he condemned many of the school manuals in this subject as being mere catalogues of dates and facts devoid of interest. It was the duty of the teacher to put life into these dry bones. No practical teacher would deny that geography, when well taught, might become a splendid aid to the growth of the imagination. There was hardly one of the natural sciences which could not be used in its cultivation. Much might be done by the exhibition of good engravings and photographs, contemplation of which elevated the feelings and charmed the curiosity in a degree altogether incredible before the experiment was made.

Edinburgh Branch, E.I.S. The first meeting for the session of the Edinburgh Branch of the E.I.S. was addressed by Mr. Alec Cran, M.A., Senior French Master, Edinburgh Royal High School, on "Method in the Teaching of French." Dr. John Gunn, M.A., presided, and there was an unusually large attendance. Discussing the relative merits of the natural and the grammatical methods, Mr. Cran practically advocated a combination of the two, prominence being given to the former in the earlier stages of instruction, and to the latter in the more advanced stages. With the aid of a class of his boys, and by means of the text-book and pictorial charts of which he is the author, the lecturer gave an admirable illustration of his method of teaching. In a short discussion which followed, the paper and the model lesson were most favourably commented upon by Professor Sarolea and by Dr. Dunn, H.M. Inspector of Schools, the latter warmly eulogising what he called the natural, common-sense style of Mr. Cran's teaching. Professor Sarolea, in the course of his remarks, expressed the opinion that the Britisher would ere long supersede the foreigner as a teacher of French and German, and said, in effect, that this was as it should be.

Kincardineshire Branch, E.I.S. At the quarterly meeting of the Kincardineshire Branch of the Institute, Mr. J. D. Johnstone, F.H.A.S., F.C.S., science teacher, Fordoun, delivered an interesting and humorous lecture on "The Gift of Eyes." The lecture dealt with the cultivation of the faculty of observation, and showed that the commonest events and objects of everyday life furnished matter for valuable instruction in Nature-knowledge. The wild-gooseberry bush, the flight of bees, poultry in the farmyard, trout in a stream, the harvest-field, and the fall of a leaf, were used as illustrations of the interest that might be awakened by the power of observation open to all.

Renfrewshire Branch, E.I.S. The first meeting this session of the Renfrewshire Branch was held in Greenock, Mr. Andrew Brown, M.A., Inkerman, presiding. At the outset Mr. D. M. Doak referred to the death of Dr. Smith, the late general secretary of the Institute, and it was agreed to record in the minutes an expression of regret at the loss sustained by education in Scotland thereby. A large number of ladies were present to hear Miss Haddow's exposition of her new system of teaching reading. Miss Haddow claimed for her system of teaching reading that pupils were enabled by it to read at a much earlier age than by any other method. She read extracts from inspectors' reports to show the successful results produced by the system, and pointed out that these results were brought about by the scientific principles on which the system was based. Several teachers who have introduced Miss Haddow's method bore testimony to its effectiveness.

Aberdeen Branch, E.I.S. The monthly meeting of the Aberdeen Branch was lately held in Gordon's College. The president, Mr. D. B. Lothian, referred to the death of Dr. Ogilvie, Her Majesty's Senior Inspector of Schools. Those who had been under Dr. Ogilvie's jurisdiction, he remarked, recognised that in him they had not only a superior official, but a genial and kindly man who was their friend. Mr. Duthie, in seconding the chairman's motion to minute the members' regret, spoke of Dr. Ogilvie as an accomplished scholar, a distinguished educationist, and a *beau ideal* inspector. Mr. Malloch, Perth, read a paper on "Brush Drawing and Blackboard Drawing under the

New Alternative Syllabus." The paper was interesting and instructive, and showed the advantages of the new syllabus over the old in its giving the children greater freedom in their efforts. To this end he recommended the study of the things themselves, and not mere copies.

NOTES FROM THE NORTH.

Dearth of Male Teachers. From the results of the most recent examinations held by the Scotch Education Department in connection with acting teachers and graduates, it would appear as if the dearth of male teachers was increasing rather than diminishing in intensity. There were at this examination thirty-one graduates (males) examined under Article 47 II. (*c*), all of whom passed; but in view of the recent development of higher education, consequent upon the introduction of the New Code, these will not to any very great extent supply the demand for teachers in secondary departments and higher-grade schools. At the same time, there were twelve acting teachers (males) examined on second year's papers, and of that number only one passed, so that from this source the supply need hardly be taken into account. Of Queen's Students examined under Article 96 of the Scotch Code, there were only fourteen in the second year. It would therefore seem as if the training colleges were likely to prove the only means of supplying the profession. The question of the supply of male teachers is a serious one, and it looks, without taking too pessimistic a view of the situation, as if the state of matters existing in America were about to prevail in this country. In other words, the profession is not at the present time attracting into it anything like the number required to fill up the waste calculated by the Department at six per cent. In fact, there is barely three per cent. being accounted for from every source. The two main factors accounting for this state of affairs are, first, the want of prospect consequent upon the large number of assistant teachers, who can never in the ordinary course of events expect to become headmasters, and who must therefore continue to swell the increasing army of "permanent assistants;" and second, the inadequate salaries offered to such. The latter is especially felt by those who have been ten or even more years in the profession. The minimum salary offered is rising, no doubt, all along the line, but the maximum is at the present time remaining absolutely stationary. Not many years ago, when a student left the training college he was considered fortunate if he obtained £80 a year, and the number of applicants for appointments was always very great; now no one requires to take less than £90 or £100, and for these the applicants are few. This month one of the large city Boards in Scotland, on advertising for an assistant at £80, did not get a single application, while another Board, with one of the best scales, if not the best, in Scotland, had not a dozen applications for six vacancies; and country School Boards are being forced, through lack of applicants, to give the higher standard work, which was formerly done by males, to female teachers. The question of increasing the maxima will now have to be faced, and Boards who have regulated their action by the so-called economic laws of supply and demand will be forced to give more liberally to the older members of their staffs.

Commercial Education. In my last month's notes I referred to the action of the Glasgow Chamber of Commerce with respect to this subject. The chairman of the Glasgow School Board (Sir John N. Cuthbertson), in dealing with the question at the usual meeting of that Board, expressed his opinion that the scheme of Dr. Jack was a satisfactory one, and was very sorry to see it had met with so much opposition from the members of the Chamber. He deprecated the idea that commercial education was a matter for the School Board alone; he thought it was the duty of every section of the community to assist in this matter. He was of opinion that it would be of great advantage to the School Board if they had assistance from the Chamber of Commerce, and were kept in contact with those who were familiar with the requirements of commercial training. In order to develop commercial education, it is necessary, as Sir Michael Hicks-Beach pointed out in a recent speech, that in the first place the pupils of the elementary schools should be well grounded at the elementary stage; that they must learn the real meaning of the mother tongue; that they should learn not merely to write, but also to write well; that they should be taught not merely arithmetic, but how to do sums accurately, and bring the answers right. These were simple things—reading, writing, and arithmetic. These were at the bottom of the whole; and if a child did not learn these well, he did not believe we could safely build higher and more important things upon them. From his common-sense observations on the subject, it would appear that commercial education can only be successfully completed if the foundations are strong and sure; and inasmuch as the proper laying of these is the work of our Board Schools, the Chambers of Commerce throughout the country would do well to co-operate with the School Boards, as the School Boards would profit by studying, in some degree at least, the wishes of the Chambers of Commerce.

Manners and Morals. Whether it is that the Scotch Code requires "that all reasonable care is to be taken, in the ordinary management of the school, to bring up the children in habits of good manners and language, and also to impress upon the children the importance of consideration and respect for others," and visits with a decrease of grant any observable neglect of these requirements, or because at the close of the summer recess the School Boards have very little business to transact, certain it is that annually there is quite a long talk about the manners and morals of the school children. The manners and morals of the children of the present day are, it is true, not all that should be desirable; but on whose shoulders rests much of the responsibility? In these days we fear there is a great relaxation of parental control, and to this cause perhaps, more than any other, is attributable much of the weakness. But there is another cause which operates very strongly, and that is the very loose working of the compulsory clause of the Education Act in respect to attendance. The children who are hardly ever within school walls are those who have brought the others into disrepute. In Scotland the percentage of attendance is very good, but it is not nearly so good as it should be. The large percentage who are habitually absent, and who are either defying parental authority or being abetted by parents, are the weak links in our educational system: and as the strength of a chain is usually tested by its weakest link, so it would seem as if our modern educational system were a failure because it is making no impression on those who hardly ever come under its sway. Lord Balfour of Burleigh referred in a recent speech to the fact that there were no fewer in their police courts than 2,743 convictions of boys and girls under twelve years of age, and between the ages of twelve and sixteen 6,951 convictions in 1898. That, he thought, pointed to a weak spot in their administration. Most of these children, if not all, must have been somewhere at school; and surely, by a better system of connection between the parents and the educational authorities, much might be done to reclaim those children before they entered upon a career which to many of them would lead to disastrous consequences in after-life. It is this better system of connection between the parents and educational authorities that we desire to see. Until the attendance at our schools becomes a greater matter of concern to both; until the number of pupils who are habitually absent becomes very much smaller; until the compulsory clauses are more rigorously and more effectively put into operation, so long shall we have to deplore this large prominence of juvenile crime and of doubtful manners and morals. Again, within the school there might be smaller classes; the size of classes in many of our large cities prevents the individual attention necessary to the pupil, and hinders the influence of the teacher's personality in the matter.

True human training requires that man should be developed from within himself, a unity of spirit and feeling cultivated, and educated into an independent and all-sided expression of the unity of his mind and feelings.—*Froebel.*

OUR CLASS-ROOM AIDS

NOTES OF A LESSON ON MILK.

By WILLIAM DONE, B.A., *Head-Master of Brighton Pupil Teachers' School.*

Articles of Illustration.—Some new milk; skim-milk; some rennet, or a little vinegar; specimens of butter and cheese; and the diagram accompanying this month's PRACTICAL TEACHER.

HEADS.	MATTER AND METHOD.
I. *Some of the chief properties of milk.*	Let the children examine the glass of new milk, and elicit its colour. Compare with the colour of skim-milk, and also with that of cream itself. Let a child taste the milk, and say whether it is sweet, sour, or tasteless.
II. *Uses of milk.*	Question out that very young children are fed on milk alone, consequently it must contain all the substances necessary to form a complete food. Milk is called a *perfect food*, and consists of nitrogenous substances—fat, sugar, salts, and water.
III. *Sources of milk supply.*	The great source of our supply of milk in this country is, of course, the cow; but the children will probably be acquainted with goats' milk and that of asses. Both these last are more easily digested than cows' milk, and so suitable for delicate infants. A glance at the diagram will discover other animals which yield good milk, though not in such common use here at home.
IV. *Some products of milk.* 1. *Butter.* (*a*) *Cream.*	We notice in the diagram the picture of a corner of a dairy. What substance is in those shallow pans? The cream is the fatty part of the milk, and, being lighter than the remainder, it rises to the top when the milk is at rest. What is the advantage, then, of placing the milk in a shallow vessel? Ask if any one has been in a dairy and noticed how cool it is. A temperature of about 50° is best for getting the cream to rise. The depth of the milk in the pans is about four or five inches. This method of obtaining the cream is called *shallow setting*. There is another method called *deep setting*, seen in the diagram, when the milk is poured into pails about one foot and a half deep. These pails are sometimes surrounded by ice, the temperature of the milk inside thus falling quickly, and causing the cream to rise faster. If shallow pans are used, the milk usually stands a whole day in summer before it is skimmed, and two days in winter. Alluding again to the dairy, one always notices its extreme cleanliness. Milk standing is very apt to take up germs of disease, and severe illnesses—such as typhoid fever—have been caused by drinking contaminated milk. Further, unless the containing vessels themselves are kept scrupulously clean, the milk will quickly turn sour. In large dairies these dangers are partly avoided, and the cream obtained also very quickly, by using a machine called a *centrifugal extractor* instead of the pans or pails.
(*b*) *Skim-milk.*	The milk without the cream is called *skim-milk*, and is very nourishing as a food.
(*c*) *Churning.*	Let the teacher put a little cream in a glass bottle which can be rapidly rotated in the hands, thus illustrating the formation of butter. Explain what happens. The fat of the cream is composed of very small, round particles, each enclosed in a delicate covering like a bag. By shaking the cream these coverings burst, and set the fat free. The fat runs together into little lumps; these unite into larger ones, until at last we get a comparatively large mass. Call attention to the liquid left in the bottle, in which the butter is floating: this is *butter-milk*. We notice in the diagram two forms of churns by means of which butter is made in a dairy. The most familiar one to the children will be the barrel-churn. The next operation is to place the butter on a cool slab and squeeze it well with the hands, so as to press out all the butter-milk possible. It is furthermore well-washed, because if butter-milk is left in it, the butter will sooner turn rancid, and is, besides, not so digestible. A little salt is rubbed in to improve the taste and help to preserve it.
2. *Cheese.* (*a*) *Rennet.*	Take a little fresh milk again in a bottle. Add a small quantity of rennet, or, failing that, a few drops of vinegar, and stir it. A white, curdy substance forms. Compare with the colour and the way butter was formed.
(*b*) *Curd.*	When we spoke about the constituents of milk, we mentioned that one of the foodstuffs contained in it was nitrogenous. The white, curdy substance obtained now is that nitrogenous substance *casein*, which holds with it also the cream or fat of the milk, and the salts. The watery fluid left is called *whey*.
(*c*) *Whey.*	On a large scale the milk is placed in a tub and warmed to the temperature of a hot summer day. Extract of rennet is added—about one tea-spoonful to six gallons of milk. The curd is taken from the tub eventually, and cut and broken into small pieces, to allow all the whey to drain out. Salt is added—about 2½ lbs. to 1 cwt. of curd—and the mass is then placed in a *vat* lined with a thin cloth. The vat (which is a kind of tub) and its contents are put into a heavy press, and left thus for a day. The second day the cheese is turned out of the vat and put into the press again, encased in thin cloth. On the third day it is taken from the press and placed in the storeroom. In this cheese-room, as it is usually called, a ripening process goes on, the cheeses being repeatedly turned about; and they are ready for sale in about six months. When new, cheese is tough; it is best suited for eating at an age of nine to twenty months.
3. *Kinds of cheeses.*	Small portions of some of the following cheeses might be shown: *Cream cheese*, consisting of the fresh curd only slightly pressed; *Stilton* and *Double Gloucester*, which are rich cheeses, having cream added to them; *Cheddar*, made from the best new wilk. Cheeses made from skim-milk, such as *Dutch* and *Suffolk*, might be compared with the above.

PRACTICAL ELEMENTARY SCIENCE.

AN EXPERIMENTAL COURSE COVERING THE REQUIREMENTS OF BOTH THE DAY AND EVENING SCHOOL CODES IN PHYSICS AND CHEMISTRY.

BY THOMAS CARTWRIGHT, B.A., B.SC.,

Author of "Practical Chemistry," "'Section One' Physiography," etc.

The General Properties of Matter.—The pupil will hardly need to be reminded of the fact that one most important property of matter—namely, that all **matter occupies space**—has already been established. It will be necessary, however, to demonstrate this in somewhat different form. This will best be done by means of a very simple experiment, which every student should be called upon to perform, preferably in class, but, if desired, at home. All that will be required in the way of apparatus will be a wide-necked bottle, a basin, and a piece of glass or metal tubing bent at an obtuse angle (a clay pipe will do very well).

The tubing may be given to the scholar, but he should be called upon to provide himself with the bottle and the basin. The bottle should be filled with water, and should be inverted in the basin, which has previously been provided with water. Placing the crook of the glass tubing under the mouth of the bottle—which stands on two pieces of stone, and not on the bottom of the basin—the experimenter blows through the tube, and so displaces the water and fills the bottle with air from his lungs. The question to be faced now is, why does the water leave the bottle? The reply to be sought is, that water and air cannot be in the same place at the same time; which is another way of calling attention to the general property of matter known as **exclusiveness**, or, as it is more generally but less happily called, **impenetrability**. The fact will be understood better than the name, the simplest expression of the fact being that **no two particles of matter can occupy the same space at the same time.** It should be shown that this is only another way of saying that matter has extension, or occupies space—in support of which many common experiences may be given, such as the rise of water in a bath when the bather jumps in; and the old tale of the crow that got water out of the narrow-necked jar by dropping in pebbles until the level rose sufficiently high for him to drink will not be *mal à propos*, nor will the jocular question of Charles the Second to the scientist fail to fix this exclusiveness upon the youthful mind. "Why," he is reported to have asked, "does a bowl filled with water not run over when a fish is put into it?" The pupils will perhaps be caught, as was the savant; and the teacher may retort, as did His Majesty, that the water *does* run over. To prove this, the pupil should be instructed to fill the bottle or the basin full of water, and then to carefully drop a good-sized stone into the water. The running over that follows is another piece of evidence in favour of our contention that all matter is exclusive or impenetrable.

Inertia.—This will be easily grasped, in so far as concerns the property of remaining in the same state of rest. That matter cannot of itself move is proved by so many frequent experiences, that nothing need be done by way of experimental proof of this part of the law; but the statement that matter continues in the same state of motion unless interfered with or acted upon by some force external to itself is not so easily understood. The teacher should refer to skating or sliding, and ask why progress is so much easier upon ice than upon surfaces less smooth. What would happen if friction at the surface were to be altogether removed? Would a moving body go on for ever at the same rate and in the same direction? This should bring in the friction due to the air. Suppose the air to be removed, so that no opposition to movement is experienced: a moving body will continue at the same rate, and in the same direction, for ever, unless acted upon by some force outside itself. It is usual and convenient at this stage to introduce the idea of force. As all bodies are inert, they cannot begin to move, they cannot cease from moving, they cannot increase or decrease the rate of motion, nor can they change the direction in which they are moving. Yet nothing is more common than to see a body starting into motion, ceasing from motion, changing its speed or changing its direction. Hence there must be something that causes bodies to move and stop and change their direction. This "something" is called force; and the student must be plainly told that it is useless for him to ask himself what force is: it is enough for us to know what it can do—namely, change the state of rest or motion of an inert body.

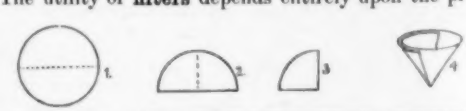
Extension, Exclusiveness, and **Inertia** are so important as to be called the **essential properties of matter.**

Weight.—It will be admitted by all that liquids and solids have weight. This is not so certain in the case of gases. Hence the aim of this part of the course is to prove that air, and therefore all gases, have weight. This can, of course, be proved by weighing a flask before and after exhaustion by the air-pump. But a much simpler experiment, which can and should be performed by every pupil, is as follows:—Take a round-bottomed eight or nine ounce flask and fit it with a one-holed rubber cork. Through the hole in the cork fit a short piece of glass tubing carrying a piece of rubber tubing to which is fitted a clip. Before corking, place about twenty or thirty cubic centimetres of water in the flask. Take the clip from the rubber tubing, so that air may escape from the flask. Cork, and proceed to boil the water in the flask for about five minutes. By this time the steam will have driven the whole of the air from the flask. The clip is allowed to close the rubber tubing whilst yet the water boils; and then the flask, having been allowed to cool, and after having been wiped thoroughly dry, is carefully weighed. The clip is now opened, and there is a palpable inrush of air. The flask is again weighed, and an increase in weight proves that air has weight. By measuring the volume of the flask, and by subtracting therefrom the volume of the water that remained after boiling, it may be ascertained what the exact weight of a given volume of air is; but this enlargement of the experiment should not be indulged in except by the most intelligent of the class.

Porosity.—The first thing will be to distinguish between **sensible pores,** as seen in *sponge*, *brick*, *pumice-stone*, *bread*, *charcoal*, *cane*, and *wood*, all of which should be given to the class for examination. It should then be stated that there are other pores much more minute, which cannot be seen, but can only be judged to exist from the fact that particles of matter can be taken in without increasing the bulk of the porous substance. This applies to solids, liquids, and gases. With respect to solids, a simple, telling experiment, requiring only a piece of chamois leather and a small portion of mercury, is recommended. The mercury should be squeezed through the leather by each pupil, who should further examine the wash-leather with a magnifying-glass to see whether the pores are sensible or not.

In this connection should be mentioned the famous **Florentine experiment,** in which a hollow sphere was made of gold, and, after having been filled with water, was hermetically sealed and then hammered—the result being a very slight flattening, and the bedewing of the exterior of the sphere with water that had been squeezed through the pores of the metal. The experiment has been many times repeated with silver, copper, and other metals; always, however, with the same result.

The utility of **filters** depends entirely upon the property



of porosity. How this works should be made clear by giving each pupil a filter-paper, folded up as in the diagram. If

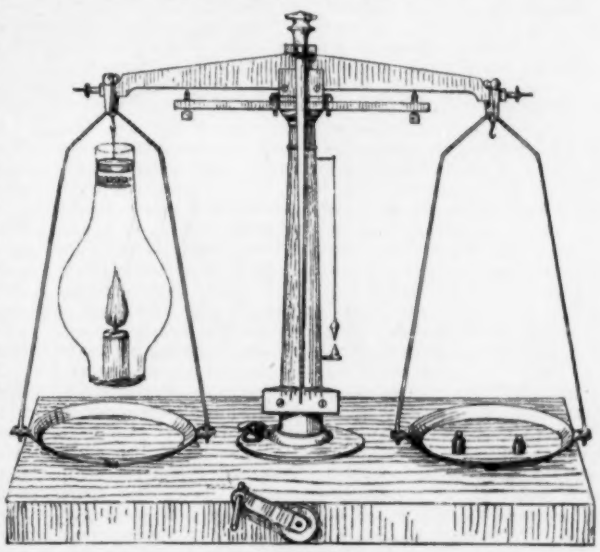
filter-funnels are available, they should be used. If not, they may easily be extemporised by folding up a piece of cardboard, or, better still, lead-foil in which tobacco is wrapped, the bottom of the funnel thus extemporised being, of course, open. Some muddy water is now passed through the paper funnel, and is caught in a test-tube or tumbler, when it is found to be quite clear. If not, the liquid should be again poured through the funnel. It will, of course, be very desirable to show a filter; and a telling experiment on the same lines may be made by passing some brown sugar solution through bone charcoal held in the filter funnel. This might be made a class experiment, as bone charcoal is very cheap.

Liquids are shown to be porous by the power that they possess of dissolving various substances. Each pupil should be provided with a teacup or a tumbler, which is to be filled up to the brim with water into which salt is to be carefully poured. The disappearance of the salt is a sure proof of the porosity of water, although the most powerful microscope does not make the water-pores visible to the eye. Another simple experiment, requiring only a piece of glass tubing about twenty-five or thirty inches long, and about half an inch in diameter, one end being closed, is as follows:—The tube is half filled with water, and then a tube of smaller bore, sufficiently long to reach to the bottom of the closed tube, is used to convey either alcohol or vitriol (sulphuric acid) to the bottom of the tube without disturbing the water. By this means the tube is completely filled with liquid. The end of the tube is closed by means of the thumb, and the two liquids are made to mix by inverting the tube. It will be found that the tube is now no longer full. In fact, if the alcohol used were pure, a contraction of nearly an inch would take place. This contraction in bulk can only be explained on the assumption of the porosity of the liquids. Some of the alcohol must have "gone into" the water, and *vice versâ*. For demonstration purposes the experiment may be performed even more simply by measuring out half a pint of alcohol and the same quantity of water, and then pouring the two half-pints into a pint vessel, which will be found not to be filled by the water and the alcohol, which must therefore be admitted to have shrunk in the mixing—the shrinkage, of course, being due to porosity.

The porosity of gases is evident from their extreme compressibility. There must be spaces between the particles, or how could compression be possible? The dew that appears on the grass and on the windows is another proof; for this water came, of course, from the air, in which it was dissolved, so to speak. The opening of a bottle containing ammonia will teach the same lesson of the porosity of the air, into which it immediately passes when the stopper is removed from the bottle—although, of course, the room was full of air at the time of the opening of the bottle, and the ammonia can only pass into the intermolecular spaces or pores of the air. The question may, and probably will, arise as to why liquids are porous to some substances and non-porous to others. For example, why is water porous to sugar, but non-porous to chalk? To this it may be replied—(1) that the water must be able to break up the particles of the substance, which is done by virtue of an attraction between the water and the substance somewhat analogous to adhesion; and (2) that the particles must be small enough, when broken up, to pass into the water-pores. It is because water can break up sugar into sufficiently small particles that sugar is dissolved. Chalk is not broken up into sufficiently small particles; hence its non-solution by water.

Compressibility and Elasticity.—These properties naturally follow porosity. If matter is regarded as granular—that is, as consisting of innumerable small particles separated from each other by spaces or pores—it is not difficult to conceive the possibility of forcing the particles closer together, or compressing the substance, whether solid, liquid, or gas. It will probably be objected by the sharp scholar that we have previously defined liquids as incompressible fluids, and it will be seasonable to tell the class that, although the atmosphere presses down upon the waters of the ocean with the enormous pressure of 15 lbs. to every square inch, it has been proved that this only compresses the water $\frac{1}{20000}$th of its bulk. Hence the fitness of the name "incompressible fluids" as applied to liquids. In addition to the bottle experiment on the minute compressibility of water as a typical liquid, the ordinary squirt, which many boys will be found to possess, may be called into requisition for a class experiment. Having filled the squirts completely with water, the boys should be instructed to put a finger over the exit, and then to try and push down the piston—a feat which they will find impossible to accomplish. The Florentine experiment may also be again referred to. As to **solids**, a number of these—such as indiarubber, cork, wood, iron, and pebbles—should be examined. That the three first are compressible is evident; the compressibility of the two last cannot be shown to the class, who must be told that all solids are compressible, but in very varying degrees. The extreme compressibility of gases, coupled with their equally great elasticity, is their most salient feature. The downward pressure of a tumbler upon water should again be performed by the class, the decrease in volume of the air being again noted. The pupils should be told that it is not difficult to decrease the volume of air a hundredfold, and that immediately upon the removal of the pressure the air completely resumes its former bulk. This will lead naturally to a consideration of the general property elasticity, concerning which a caution must at the very outset be given. A piece of elastic cord should be carefully measured, and then stretched very considerably again and again, the pupils measuring it at the end of each stretch. It will be found that at last the elastic does not resume its original length, but is permanently longer than it was at the beginning. Hence we say that elastic is **not perfectly elastic,** for it is **ability to recover** its former shape or volume after distortion that constitutes the elasticity of a body. Very few solids have this property to any great extent, whereas liquids and gases possess it to an eminent degree. Hence gas and liquids are perfectly elastic; solids are only imperfectly elastic.

Indestructibility.—This property is best dealt with by the teacher, who can choose one of three very common modes of procedure—namely, the candle, the phosphorus, or the magnesium experiment. Others will be found detailed in the author's "*Section One*" *Physiography*, p. 26, or in works on Elementary Chemistry and Physics.



THE BALANCE.

The Candle.—A lamp-glass is fitted with a cork containing several holes, and carrying a candle which is lighted. In the

upper part of the glass is wedged a tray, upon which are placed some lumps of caustic potash, with which the upper part of the lamp-glass is plugged. The whole is fixed to the arm of a balance, and is carefully counterpoised. After burning for some time, it is noticed that the candle-arm of the balance goes down, thus proving that the candle in burning not only does not lose but actually gains in weight.

Magnesium.—A crucible containing about a yard of magnesium ribbon is very carefully counterpoised. The magnesium is made to burn, and upon reweighing it is found that the magnesium, like the candle, has gained weight in burning.

It should be explained that the gain in each case is at the expense of the air, some of which has been used up in the burning of the candle and the magnesium. The class may be called upon to show that air is necessary to burning, by placing a glass pickle-jar over a piece of burning candle, which after a time goes out, because it has used up all the air that can conduce to burning.

Phosphorus.—A piece of phosphorus about the size of a pea is placed in a large (10 or 12 oz.) round-bottomed flask, which is very carefully counterpoised. The hand of the experimenter should be wrapped in a duster, and the flask should be gently warmed in a part of the bulb remote from the phosphorus. As soon as the phosphorus catches fire, it is advisable to hold the flask under a table or behind the blackboard in such a way that if an explosion takes place, as is often the case in this experiment, no damage will be done either to the class or to the teacher. The flask is allowed to cool, and is then placed upon the balance again, when the weight will be found to be exactly the same as before, showing that there is no gain or loss in weight upon burning. It should be pointed out that in this case all the air used was weighed when the flask was counterpoised, so that there has been no chance for any gain. This was not so in the two previous experiments. The class can now be told that, whenever great care is taken to allow nothing to escape when matter is apparently destroyed, it can always be shown that no loss, and therefore no destruction, takes place. Matter may be made to change its form, but it cannot be annihilated. There is just as much matter in the universe now as there was a million years ago, and a million years hence the quantity will be exactly the same as now. **Matter cannot be destroyed,** any more than it can be created. All the means at the command of man cannot put out of existence a single particle of matter.

Matter transmits force and offers resistance. The students are directed to wave their hands to and fro in the air, and to move them in water. They may also be called upon to push the desks or a table. In each case there is a resistance on the part of the air, water, desk, or table, due, of course, to the inertia of the matter experimented upon; and so it is always. Matter offers resistance. Each student may now be sent to blow a feather up in the air. The motion given to the air by the blowing is transmitted to the feather. A piece of cork is next floated upon water, and the water is set in motion by the hand. The motion communicated to the water by the hand is transmitted to the cork by the water. A map-hook is now taken by the pupils in succession, with which a map is taken down and put up. The motion communicated to the map-hook by the hand is transmitted by the hook to the map. It should be explained that this is always the case with machinery, which by itself is incapable of doing work. Being matter, it is inert; but as it can communicate motion or force, it transmits the motion of the hand or of steam to the various parts, and so does work.

Divisibility.—Let the students break up a piece of chalk, first of all into small pieces, and then into fine powder. Show that all solids can be similarly divided. Refer to writing with chalk, pencil, and blacklead: the mark is really a mass of fine powder. Next let the pupils drop some water on to a nutmeg-grater, or any similar sieve, and show how easily liquids may be divided into small particles. With respect to gases, the bottle of ammonia should again be used. So easily are gases divided, that it is only necessary to give them vent, when they at once, of their own accord, break up and spread themselves throughout any space, however great. Reference may now be made to what was said above concerning the granular structure of matter. It is obvious that division could be carried on until we arrive at these minute granules, or **molecules** as they are called. Can we go further? Yes; there is every reason to believe that these molecules may be broken up into minuter particles called **atoms,** which, in their turn, cannot be divided, not because we lack skill to do this, but because there is something in the very nature of an atom which renders it impossible to divide it. We say, then, that matter is divisible until we get to the atom, and the atoms are by nature indivisible.

Résumé.—The general properties of matter are: **impenetrability** or **exclusiveness** (extension), **inertia, weight, porosity, compressibility, elasticity, indestructibility, resistance, divisibility,** and **power to communicate force or motion.** These properties are possessed by matter in all its states, and must be distinguished from those peculiar properties which are consequent upon matter existing in a special state, as solids, liquids, and gases.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

ABYSSINIA.

ABYSSINIA is too often considered a savage and uncivilised country. It is, however, an ancient empire, unique among African powers in that it is the only one that has to any considerable extent been able to check European domination.

The people are not negroes, but with their clear-cut features, high brows, refined lips, and straight hair, notwithstanding their dark colour, are very like the ancient Romans; and the similarity is not lessened by the national garment, the chemma, which in shape and draping resembles the Roman toga.

The average Abyssinian is brave and enduring, courageous and strong-minded, sober and just; and he possesses all those qualities necessary to the making of a good soldier.

As early as the fourth century, Athanasius sent an apostle to evangelise Abyssinia. His mission met with success, and since that time the Abyssinians have been in communion with the Alexandrian Church. Their head is always a Copt selected and consecrated by the Patriarch.

Abyssinia, or Ethiopia, consists of the kingdoms of Tigré, with Lasta in the north-east; Amhara, with Gojan in the west and centre; Shoa in the south; and other ill-defined territories extending south and south-east, including portions of Galla and Somali lands. The total area is about 150,000 square miles, and the estimated population is about three and a half millions.

Various European powers—Britain, France, Russia, and Italy—have, at various times, endeavoured to obtain territory and trading privileges; and the negotiations have not always been of an amicable character. In 1868 the British overthrew Theodore, King of Amhara. The storming of Magdala was one of the most brilliant episodes in the annals of the British army. Three hills, flanking and protecting each other, connected by an isolated mountain, made Magdala a stronghold perhaps unequalled in all the world. The attacking troops, however, resolutely forced their way over all obstacles with a loss of only ten men wounded—thus ending a surprising and brilliant campaign.

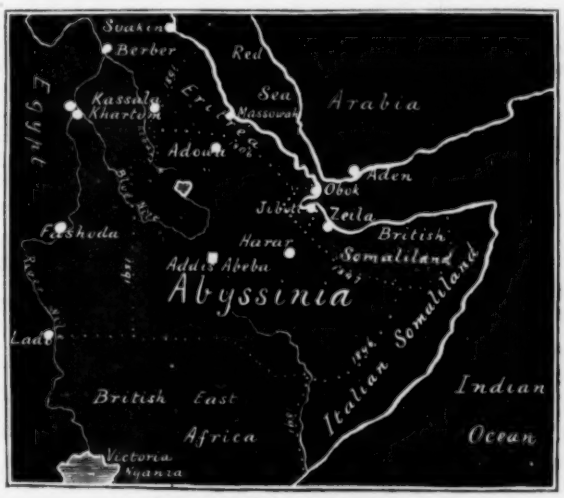
Theodore was succeeded by Johannes (John) the Second. The chief features of his reign were a war with Egypt in 1875; and ten years later, at the instance of the British authorities, an attempt to drive the Dervishes from Galabat. After various encounters, the Khalifa offered terms of peace if the Abyssinians would embrace the Moslem faith. Six days' journey from Galabat the Dervishes gained a great victory. Gondar was sacked, the males were massacred, and the women and children were taken into slavery. Several months later, at Galabat, the Abyssinians again lost heavily; the head of King John was sewn in leather and sent to Wadi Halfa by the victorious Khalifa as an indication to the Egyptians and the British of the fate that awaited them.

In 1887 the Italians came into conflict with King John, and of an Italian force of 500 men only one escaped. The death of the king was followed by internal dissensions respecting the succession. Eventually Menelik, King of Shoa, aided by the Italians, became Negus, or Emperor of Ethiopia. By the Treaty of Uchali in 1889, Italy considered Abyssinia to be an Italian protectorate. Menelik repudiated this, and hostilities broke out. The struggle was a prolonged one, but at Adowa, March 1, 1896, Italian dreams of an empire in Africa were rudely shattered—two generals, 200 officers, and nearly 10,000 native troops serving under the Italian flag were slain, and a peace was speedily concluded.

In recent years Menelik has upon several occasions mobilised his forces, urged thereto, it has been feared in some quarters, by the success of the British arms in the Soudan, and which he may have considered to be a menace to the integrity of his western boundary. These fears have, however, been groundless, the king's operations being directed against some turbulent chief, who was showing neglect of his feudal responsibilities. Very recently friendly messages and protestations of friendship have been exchanged between Queen Victoria and Menelik. This fierce ruler of a fierce and warlike people is remarkably well informed, and takes a keen interest in European matters, not even neglecting science. He is of fine proportions, and he possesses a dignified bearing, quite in keeping with the capable part he is playing in African politics.

Abyssinia consists of a series of table-lands, traversed by high mountain ranges. There are two well-defined slopes, one towards the Red Sea, and the other towards the Nile. From Lake Dembea issues the Bahr-el-Azrek, or Blue Nile; and the Atbara, or Black Nile, also takes its rise in this region.

The soil is fertile, and yields barley, cotton, coffee, flax, fruits, maize, sugar, millet, tobacco, wine, etc. The variety of productions is owing to the diversity of climate, which is intensely hot in the valleys, and more temperate in the elevated districts. Agriculture is in a very backward condition, and to this day the best native plough consists of a pole with an iron spike at the end.



BLACKBOARD MAP OF ABYSSINIA.

When European methods are adopted, the country will be able to produce food-stuffs and raw materials for manufactures far in excess of her own needs; and if she only possessed a good port, her situation for commerce commands marked advantages. At present nearly the whole of the trade is carried on over the caravan routes to the interior. A railway is contemplated from Jibuti to the capital, with a branch to Harar, which will, in all probability, divert much of the trade that now passes through the British port Zeila.

Education is not altogether neglected; a few of the children are taught, chiefly by the clergy, grammar, choral singing, poetry, and Bible texts. The people have no idea how far behind European civilisation they really are; if their influential men could be induced to visit foreign countries, their country would reap the benefit.

There is not a large standing army, but every yard of land pays a tax either in men for military service or goods in kind, and it may be generally considered that every man is a soldier. In the war with Italy, Menelik's army numbered quite 100,000 regulars, and it is absolutely certain there are sufficient good rifles in the country to arm that number. Including the irregulars, the total strength of the army is quite half a million men.

The Abyssinian soldier provides his own commissariat. He receives an amount sufficient to purchase a donkey to carry his provisions and other impedimenta, frequently his servant or even his family will accompany him; and thus in a campaign the number of persons to provide for is largely increased, without any addition to the fighting strength. The natives will live for a year on food that would disable Europeans in less than three months.

There are numerous towns, but few have a population of 5,000—

Gondar, capital of Amhara, 5,000.
Adowa, capital of Tigré, 3,500.
Addis Abeba, capital of Shoa, 3,000.
Ankobar, former capital of Shoa, 7,000.

Addis Abeba is the capital, and contains the palace of the Negus, which crowns a small hill in the centre.

There is a great scarcity of wood in the immediate vicinity, and long files of Gallas may be seen carrying wood on their heads from Managasha, a distance of fifteen miles. In the market the loads of six or eight men will realise only about two shillings.

Most of the internal trade is done by means of exchange. The money is minted in Italy or Austria, and the Abyssinian post-office procures its stamps from France.

The Abyssinian *ounce* weighs 430 grains, which is just the weight of the Maria Theresa dollar, the current coin. The *amole* is a stick of salt nearly a foot in length, four of which are equivalent to one dollar; they must be undamaged, or five or six will be required.

A pound of ivory = 12 oz.
A pound of coffee = 18 oz.

In measuring grain, the *kunna* = ½ of a bushel. The *metre* is largely used in Harar, but the native measures generally are the *sinze* = 8 inches; the *kend* = 18 inches.

The accompanying sketch marks the various territorial acquisitions of European powers, the boundary lines bearing the dates of the treaties confirming them.

Eritrea, an Italian colony on the Red Sea, has an area of about 4,000 square miles, and a population of about a quarter of a million. *Massowah* is the capital; a railway is being constructed to the interior.

Jibuti is the headquarters of a small French protectorate extending inland for about twenty-five miles; *Obok* is the former headquarters.

British Somaliland has been under the protection of the British since 1884. Wild animals—elephant, lion, leopard, antelope, monkey, crocodile, ostrich, etc.—abound. The exports, chiefly cattle, sheep, ostrich feathers, and gums, amount to half a million sterling. *Zeila* is the chief port and centre of trade.

Italian Somaliland is a protectorate of little commercial value.

THE SCHOOL JOURNEY.

GERMAN SCHOOLBOYS IN ENGLAND is the title of an illustrated contribution by Mr. J. Spencer Curwen which will appear in our next Number.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Head-Master of the Belvedere Pupil Teachers' Centre, First on Scholarship List, Author of "Scholarship School Management."

SPRING EXAMINATION, 1900.

Ninth Month—December.

WORK TO BE PREPARED.

1. READING AND REPETITION.

CONTINUED oral practice. Students who are weak in this subject will find considerable assistance from Forsyth's *Practical Elocutionist* (Blackie).

2. ENGLISH.

Candidates.—*Marmion*, Canto vi., lines 798 to 901.
First Year.—*The Traveller*, lines 335 to 376. Twenty roots and meanings. Derivation of all important words in the passage set for preparation.
Second Year.—*Julius Cæsar*, Act iv., Scene 3, line 121, to end of Act iv. For *Notes*, etc., see below.

All pupil teachers should procure at once "The Practical Teacher English Notebook"—indispensable for all. (*T. Nelson and Sons.*)

3. ESSAYS.

Write one or two essays each week, selecting from the following:—Our Food Supply; Autumn; The Effects of a Storm; Describe some Incident of which you have heard or read (give as graphic an account as you can); The Losses of the Blind; The Character of Alfred the Great.

4. HISTORY.

Candidates.—William and Mary, Anne, George I. and George II.
First Year.—Henry VII.
Second Year.—George III. to 1800. See *Notes* following.

5. GEOGRAPHY.

Candidates.—Scotland—counties and towns, government, etc.
First Year.—Arabia, Persia, Asia Minor, Afghanistan.
Second Year.—South America.

6. ARITHMETIC.

Candidates.—General practice on the year's work.
First Year.—Profit and loss.
Second Year.—Mensuration of rectangular areas.

7. EUCLID.

First Year.—Props. 25 and 26, with four deductions each week.
Second Year.—Revise Props. 13–16, with eight deductions per week.

8. ALGEBRA.

First Year.—Addition and subtraction of fractions involving the use of G.C.M. and L.C.M.
Second Year.—Problems on quadratics.

Notes on the Month's Work.

1. ENGLISH.

(*a*) "MARMION."

Parsing and Analysis.

Line 798. ***Far.*** Adv., mod. *on the left.*
The while. May be taken as an Adverbial Phrase, mod. *unseen*; or *while* as a Noun—Adverbial Object.
809. ***Fiercer.*** Adj., Com. Deg. Adjectival Completion of *grew.*
814. The Adjectives refer to *pennon* in the next line.
816. Adverbial Sentence to *wavered* in 818.
821. ***It lost.*** Direct Object of *will see.* Verbs of seeing, hearing, etc., often take a Noun or Pronoun with an Infinitive or Participle qualifying as the Object. In most cases it is a contraction of a Noun Sentence.
831. ***Like.*** Adv. Conj. *Pine-tree*, Nominative to *sinks* understood.
833. ***Too.*** Adv., mod. *mounted.*
834. ***Loath*** = Adj., qual. *he.* ***To leave***, Infinitive, limiting *loath.*
836–8. ***Eyes, nostrils, rein, housing***, and ***saddle.*** All Nominatives Absolute.
842. ***To mark.*** Gerundial Infinitive, gov. the Noun Sentence following.
845. ***Alone.*** Adjectival Completion of the Predicate.
850. ***Loud***—that is, *loudly.* Adverb.
853. ***But.*** Adv. of Deg., mod. *to die.*
854. ***Straight.*** Adv., mod. *up the hill.*
There. It is difficult to give a correct term to this word. It is to some extent Adverbial in function, yet not an Adverb of Place. Perhaps the best name for it is Introductory Adverb. It is usually used when the Verb precedes its Nominative.
856. ***Load.*** In apposition with *knight.*
860. ***From among.*** *From* in this case governs the phrase *among the horses' feet*; *among* governs *feet.*
862. ***Falcon-crest and plumage.*** Nominatives Absolute.
864. ***Did.*** Not Auxiliary of Emphasis, but merely helps to form a Past Tense.
869. An Exclamation.
873. ***Stars.*** Verb in the Infinitive Mood, gov. by *began.*
878. ***Last.*** There is no Noun to which this applies. Understand, *I being the last*, etc.
887. ***Alone.*** Adj., limiting *Admiral.*
890. ***Full.*** Adv., mod. upon *Scotland's host.*
892. ***Twice.*** Adv. of Repetition, mod. *must bid.*
896. This line is Adverbial to *wrung* (next line).
898. Read, *Of all whom my halls have nurst.*
899. ***Page, squire, or groom.*** In apposition with *none* (line 897).
To bring. Infinitive, limiting the preceding Nouns.
901. ***To stake.*** Infinitive of Purpose, mod. *bring.*

(*b*) "THE TRAVELLER."

General Paraphrase (continued).

Line 335. The blessings here depicted arise from the charms of freedom, and would be too great for man were they not mingled with, and tempered by, disadvantages. Although it may seem paradoxical, it is nevertheless true, that there may be such a thing as too much freedom, for unlimited freedom gives rise to many evils. The Englishman prides himself on his freedom; he is therefore unwilling to acknowledge any dependence on another: each stands proudly and haughtily alone, and there is none of that mutual consideration, esteem, and concession which tend to increase the happiness of the members of any community. The stubbornness with which each holds and maintains his own opinion to be right and all others wrong naturally leads to bitter disputes and quarrels; parties are formed, and the difference of opinion spreads over the whole nation. All are embroiled; and instead of peacefully making progress, all advance is entirely checked and stopped.

Line 349. Nor is this the worst result that ensues. The undue regard paid to personal independence seriously diminishes the national and social ties and duties which should bind man to man, and in their place there arises a keen desire for money and the power which wealth gives. Everything is made subservient to this; and if it continues to increase in the future as it has in the past, we may look forward to no very distant date when every lofty and noble thought shall be sacrificed to this miserable avarice; when the land which once freely gave rewards to her poets for their songs, to her soldiers for their gallant bravery, and to her statesmen for their wisdom and forethought, shall no longer do so, the degrading passion for wealth blinding the inhabitants to all the higher and more elevating conceptions.

Line 361. Yet it must be clearly understood that in pointing out the evils arising from excessive freedom, I neither object to the people being free, nor am trying to curry the favour of the rulers of the country. Both are very far from my desire. Freedom, like some fruitful plant or tree, requires not only nurture, but also pruning and cutting back, if it is to bear fruit abundantly; and therefore the greatest advantages are derived from freedom only when it is exercised under reasonable control. It is a matter of common experience that all cannot rule in a free country, and it is only reasonable that those who have received a good education and studied the science of politics should have a large share in framing laws for those who are ignorant. The highest pitch of freedom is reached, not when every one does as he likes—for this is licence—but when taxation and the other burdens incident to a country are so adjusted that each man bears a share proportional to his position and power.

Parsing and Analysis.

Line 337. ***Blest.*** Qualifies *such*, which is a Demonstrative Pronoun.
338. ***Even.*** Adv. of Emphasis, lim. *by Freedom.*
339. (*Which*) *Britons prize too highly.* Adj. Sent. to *independence.*
344. *Repelling* properly belongs to the first *minds*, *repelled* to the second *minds.*
348. ***Stop*** and ***fire.*** Infinitives, gov. by *feels.*
350. ***To sway.*** Object of *fail.*
353. ***Alone.*** Adj., limiting *these.*
354. ***Unknown.*** Adj., qual. *merit.*
355. ***Till.*** Subord. Conjunction.
356. ***Land*** and ***nurse.*** Nominative to *shall lie* (line 359).
359. ***Sink.*** In apposition with *land.*
360. ***Die***—that is, *shall die.* Future Tense.
361. ***Thus.*** Adv. of Manner, mod. *state.*

302. Noun Sentence, gov. by *think*.
To flatter kings or to court the great. Object, gov. by *mean*.
Great. A Collective Noun.
364. *Far.* Adv., mod. *from my bosom.*
365. *Alike.* Adv., mod. *to feel.*
367. *Alike.* Adv., mod. *undone.*
370. *To secure.* Gerundial Infinitive, dependent upon *would repress.*
371. *For.* Illative Conjunction.
372. *That those must govern those* = Noun Sentence, object of *tells.*
Who think. Adjectival to the first *those.*
That toil. Adjectival to the second *those.*
373. *That Freedom's highest aims can reach.* Adjectival to *all.*
374. *But.* Adv., mod. *to lay,* which is the completion of *is.*
Each. Distributive Pronoun.
375. *Should.* Auxiliary of the Subj. Mood.
Disproportioned. Adj. Complement of *grow.*
376. *Below.* This is really a Preposition, the sentence being—*must ruin all below it;* but without supplying the omission, it may be parsed as an Adjective.

(c) "JULIUS CÆSAR."

Paraphrase, Parsing, and Analysis.

Line 121. *Me to go in to see the generals.* Obj. of *let.*
125. *But death.* See note last month.
134. "I will appreciate his humour if he will show it at the proper time. What have such empty brains to do with the serious business of civil war?"
152. *Strong.* Adj. Compl. of *made.*
154. *Attendants.* Nominative Absolute.
169. *Myself.* Emphatic Pronoun in this case.
173. *Cicero.* Nominative Absolute.
One. Nominative Case after *being.*
191. *Even.* Adv. of Emphasis to *so.*
192. "I am as well acquainted with the philosophy that tells us to bear our griefs in this manner as you are, but I am afraid I could not put it in practice as you do."
194. Read, *Let us be alive to our work.*
209. *People.* Nominative Absolute.
215. *Ready to decline.* The use of the Infinitive to modify or limit an Adjective is very common.
240. This incident of Brutus's conversation with his boy is one of those touches in Shakespeare's dramas which reveal character more than many pages of description. It shows Brutus in a new light—the considerate master who recognises that his slave is as human as himself; the perfect gentleman, as courteous to a dependant as to an equal.

3. COMPOSITION

Inquiries are still received, "How can I improve my composition?" The answer is, "Read! read! read!" Learning rules is useless, study of text-books is useless; the student must have a wealth of ideas, and a wide vocabulary from which to clothe them. This double possession can only be acquired by wide reading, not of geography or history books, but of good literature. The plea of "no time" is not to be recognised. Every pupil teacher must find time. If this is not done, the mind is cramped, set in one groove, and the student grows up incapable of understanding or discussing any of the great problems of life and society, which are vastly more important than the most complicated fraction.

4. HISTORY.

Candidates.—In this period note very carefully the Bill of Rights—the definite settlement of questions which had agitated English minds for centuries; the reduction of Ireland and Scotland; the new laws, Triennial Bill, Mutiny Act, Toleration Act, etc., are all important. Note how William's Continental connection drew England more intimately into the arena of European politics; William's scheme to check the growing power of Louis the Fourteenth.

In Anne's reign the chief interest centres in Marlborough and his campaigns. The Legislative Union with Scotland is an important step in our history.

George the First. Prepare a table showing descent. Note "the '15," Septennial Act, the South Sea Scheme. In George the Second, Walpole's administration at home (learn a life of Walpole). The War of the Austrian Succession; "the '45," which was indirectly connected with it. The Seven Years' War: the foundation of our Indian Empire, and the acquisition of Canada. Learn lives of Clive, Wolfe, and Pitt.

First Year.—In Henry the Seventh's reign, which may be said to commence modern history, there are many important features. The downfall of the Feudal System left the king nearly absolute, and inaugurated the period of rule by mental superiority rather than by physical force. Henry the Seventh was a money-grabber—note the means of acquiring it: confiscation of the Yorkist property, by Star Chamber, by Empson and Dudley, by Cardinal Morton, by grants from Parliament for war, and by bribes from France to abstain. Note the plots, and how they failed. The marriage of Prince Arthur, and afterwards Henry, to Catherine of Aragon, helped on the Reformation; the marriage of Margaret with James the Fourth of Scotland brought ultimately the Stuarts to the English throne.

Second Year.—The finish of the Seven Years' War resulted everywhere in gain for England. The suicidal and selfish commercial policy towards the American colonies led to their loss. The causes of the French Revolution, and the incidents connected with it and arising from it, should be studied. The Gordon Riots of 1780 give a glimpse of the intolerant ignorance of the times.

5. GEOGRAPHY.

There are no particular points which need special note, except that second-year pupil teachers should note that the dispute with Venezuela has been settled by arbitration, the award of the court being a compromise, largely in favour of England. Though we have had to cede some valleys, the greater part of the land claimed by us west of the Essequibo still remains under our jurisdiction.

"I am very weak in geography," writes a student this week; "how can I improve?" Weakness in geography inevitably arises from two great mistakes—(1) in trying to learn the subject by *reading* only, when the eye requires training and the visual memory should be able to recall maps, diagrams, plans, and tables; and (2) by leaving one set of facts before they are thoroughly known, to proceed to others. Take a small book and learn that thoroughly; afterwards fill up from a larger book. Take a regular portion each week, and do it thoroughly. Haziness of ideas in geography means utter failure.

6. ARITHMETIC.

The questions set at the recent examination show that the Department insist on pupil teachers knowing not only how to work a straightforward rule, but also how to apply that rule to the solution of problems. Pupil teachers must also *think* before working. See No. 3, Boys, First Year:—

"$\frac{2{\cdot}7^{7} - 1{\cdot}4\dot{0}}{2{\cdot}7 - 1{\cdot}4\dot{0}}$ of $\frac{1}{4}$ per second."

This fraction at sight = $\frac{1}{4}$ per sec. Yet many pupil teachers worked it out fully.

Again, No. 4 (same paper):—"*The fraction* $\frac{1}{120}$ *is intermediate in value to two consecutive figures of* ·1234. *Find which are these figures, which of the two is nearer to* $\frac{1}{120}$, *and by how much expressed decimally.*"

The four figures $= \frac{1}{10}, \frac{2}{100}$ or $\frac{1}{50}, \frac{3}{1000}$ or $\frac{1}{333\frac{1}{3}}, \frac{4}{10000}$ or $\frac{1}{2500}$.

It is evident that $\frac{1}{120}$ lies between $\frac{1}{50}$ and $\frac{1}{333\frac{1}{3}}$, or 2 and 3.

$\frac{1}{50} = \cdot 2$
$\frac{1}{120} = \cdot 008\dot{3}\dot{3}$ — The difference between the first two = $\cdot 191\dot{6}$.
$\frac{3}{1000} = \cdot 003$ — " " second two = $\cdot 005\dot{3}$.

Therefore $\frac{1}{120}$ lies nearer to ·003 than ·02; and by the difference between $\cdot 191\dot{6}$ and $\cdot 005\dot{3}$, which = $\underline{\cdot 186\dot{3}}$. Ans.

In the First Year Girls' Paper we get:—

"*By how much does the G.C.M. of* 7 × 12 × 19 × 101 *and* 7 × 17 × 19 × 101 *exceed the G.C.M. of* 7 × 12 × 19 × 101; 7 × 17 × 19 × 101; *and* 12 × 17 × 101?"

The G.C.M. of the first quantities = 7 × 19 × 101.
" " three " = 101.
Difference = (7 × 19 × 101) − (101), or (7 × 19 − 1) × 101.
$\underline{13433}$. Ans.

No. 4:—"*The sum of* £17,100, 0*s.* 9*d. is to be shared among* 19 *people, each of whom is to be paid in coin. After as much money as possible has been shared equally among all, the rest is to be shared equally among as many as possible of the* 19. *How many of the* 19 *will receive less than others?*"

By inspection, each will receive £900, leaving 9d. to be further divided. If the sum meant is 9 "pennies," 9 of them will get a penny more than the 10 remaining. If the 9d. is in half-pennies, 18 of them will each receive ½d. more than the remaining one; if in farthings, 17 will receive ¼d. each more than the other two. Ans.

Second Year Papers (Boys):—

"*A watch gains* 10 *minutes a day. It is right at noon to-day; what will be the true time when the watch next indicates* 12 *o'clock?*"

It will indicate 12 at midnight.
24 hrs. correct time = 24 hrs. 10 min. watch time.

Then $24\frac{1}{6}$ hrs. watch time = 24 hrs. correct time.

1 hr. " " $= \frac{24}{24\frac{1}{6}}$ " "

12 hrs. " " $= \frac{24 \times 12}{24\frac{1}{6}}$ " "

$= \frac{24 \times 12 \times 6}{145}$

hrs. min. sec.
$= 11 \quad 55 \quad 2\frac{8}{29}$. Ans.

"A and B invested each the same amount, A in 5 per cents. at 120, and B in 4 per cents. at 80. At 1s. in the £, the total income-tax on their receipts was £5, 14s. 7d. How much income-tax did each pay, and what sum did each invest?"

Suppose each had £480. Then A gets £20 income } = £44.
" B " £24 " }

The tax on £44 at 1s. = 44s. = £2, 4s.
But £2, 4s. = $2\frac{1}{12}$ of the amount given.
Therefore £480 = $2\frac{1}{12}$ of the real sum, which = £1250 each.
The £5, 14s. 7d. was divided as their incomes 5 : 6.
A pays $\frac{5}{11}$ of £5, 14s. 7d. = £2, 12s. 1d. }
B pays $\frac{6}{11}$ of £5, 14s. 7d. = £3, 2s. 6d. } Ans.

Girls' Paper, No. 5 :—

"A boy spent $\frac{1}{12}$ of his money. Then he spent $\frac{1}{12}$ of the remainder. He had now spent 2s. 0½d. less than was left. How much had he spent?"

If original money = 1. He spent $\frac{1}{12}$, and had $\frac{11}{12}$ left. He spent $\frac{1}{12}$ of $\frac{11}{12}$, and had left $\frac{11}{12}$ of $\frac{11}{12} = \frac{121}{144}$. The difference between what was spent and what was left $= \frac{121}{144} - \frac{23}{144} = \frac{88}{144}$.

Then $\frac{88}{144}$ of the money = 2s. 0½d.

$\frac{1}{144}$ " " = 1s. 4d.

$\frac{144}{144}$ " " = 3s. Ans. 3s.

(Other questions next month if desired.)

Test Questions.

1. *Penmanship.*
Large Hand :—*Presbyterian.*
Small Hand :—*She that with poetry is won*
Is but a desk to write upon.

2. *English.*
Candidates.—Analyse and parse words in italics :—

"But *if* we *conquer*, cruel maid,
My spoils shall at your feet *be laid*
When here we meet *again*."

First Year.—(*a*) Paraphrase lines 297–309.

(*b*) Analyse :—"Thus while around.....
.....are here displayed."

(*c*) Parse—*while, around, hence, opulence, brings.*

Second Year.—(*a*) Paraphrase :—

"You have done that.....
.....dash him to pieces."

(*b*) Analyse the first six lines of the same piece.

(*c*) Parse :—"A flatterer's would not, though they do appear
As huge as high Olympus."

3. *Geography.*
Candidates.—Write a description of the Hebrides, and say something if you can of the people and their occupations.
First Year.—How is China governed? What European nations have obtained a footing there? In what places?
Second Year.—Mention twelve large towns in the United States, and say what is the leading industry connected with each.

4. *History.*
Candidates.—Explain the causes that led to the Civil War in England. Why were the Stuarts restored?
First Year.—Write a life of Warwick the king-maker, and explain what part he took in the Wars of the Roses.
Second Year.—What do you understand by the reformation of the calendar? Why was it necessary, and what important changes were made?

5. *Music* (set in October Examination).

Candidates.—(1.) What other groups of contiguous scale-tones are separated by the same intervals as

f m r d ‖ l s f m ‖ s f m r ‖

(2.) Name the following intervals :—

t_1-f, m-d^1, s_1-f, m-l, f-d^1

(3.) Write over each note and rest its value in pulses or fractions of a pulse :—

| d.t_1:d :m | s :-.l:s | f :- :- | m :-.r:d ‖

First Year.—(1.) Rewrite the following passage, making a change to the first **sharp** key at (*a*), and a return to the original key at (*b*) :—

Key C. (*a*) (*b*)
d s m r fe l s d^1 t s fe l s m l s t d^1

(2.) Write the following intervals :—
Minor sixth above **ray**; augmented (or pluperfect) fourth below **me**; perfect fifth above **te_1**; minor seventh above **doh**; minor third above **soh.**

(3.) Rewrite the following in four-pulse measure, doubling the value of each note and rest :—

| m.f:s. | f.,m:r | d.d,r:m,f:s | l_1.t_1:d ‖

Second Year.—(1.) Name the intervals formed by each of the following notes with the others :—**r f se d^1.**

(2.) Write out the following in four-pulse measure :—

$1\frac{1}{2}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{2}$ 2 $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{4}$ 1 2 $\frac{3}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{2}$ 1 $\frac{3}{4}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{2}$ 1
s l s f r rest **s d^1 t l s r m r f m r s f m r m d**

(3.) Explain (briefly) the meanings of the following musical terms :—Forte, Legato, M·60, Adagio, Da Capo.

AUTUMN EXAMINATION, 1900.

Third Month—December.

1. READING AND RECITATION.

Continue oral practice in these subjects. Aim at something more than mere repetition of words.

2. ENGLISH.

Candidates.—*Marmion*, Canto vi., lines 231 to 350.
First Year.—*The Traveller*, lines 99 to 144, with twenty roots and meanings per week, and derivation of all important words in the passage set.
Second Year.—*Julius Cæsar*, from Act ii., Scene 1, to

" Dear my lord,
Make me acquainted with your cause of grief."

All notes, meanings of allusions, derivations, etc., must be learned as the monthly portion is taken.

(For full Notes on Paraphrasing, Parsing, and Analysis, see July Number of "The Practical Teacher.")

(Every pupil teacher should obtain the *Pupil Teachers' English Notebook.*)

Essay Writing.

Send up an essay occasionally for criticism. Regular and careful practice is most essential to success.
Subjects for this month :—
(*a*) The beauties of summer; (*b*) Your home enjoyments; (*c*) Thrift; (*d*) A railway station; (*e*) Clouds; (*f*) "A rolling stone gathers no moss." In dealing with a subject like the last, take the following arrangement of ideas :—

1. *Literal meaning.* Compare the moss-covered stone of the hillside, fixed and immovable, with the clean, worn, rounded pebble of the sea-shore, continually rolled about by the action of the sea.

2. *The wider meaning.* That a roving disposition never accumulates anything, but a settled and contented spirit does.

3. Enlarge and enforce the meaning by applying the proverb to certain instances :—
(1.) *Money.* It is the man who settles in one place and devotes himself to business who acquires a fortune, not "the wanderer."
(2.) *Knowledge.* The youth who dabbles in everything knows nothing.
(3.) *Success.* Steady and persevering application necessary, etc.

3. History.

Candidates.—Henry the Second to end of Henry the Third.

Chief Points.—Henry the Second. Restoration of order. Quarrel with Becket. Constitutions of Clarendon. Scutage. Revolts and Scotch invasion. Conquest of Ireland.

Richard I.—Richard's share in the third Crusade. What the Crusades were; why they attained such a popularity. *The Talisman* supplies much interesting information on this point.

John.—John's Usurpation. Loss of Normandy. Quarrel with the Pope over the election of church dignitaries. Interdict and Excommunication: what they were, and how they differed. Why did the latter cow John when the former had no effect? Discontent of the barons; events leading up to the Charter. Note also how in this case the barons and common people were united as *Englishmen*. The chief provisions of Magna Charta must be learned.

Henry III.—Provisions of Oxford. The Barons' War. De Montfort's Parliament. Note that De Montfort made an innovation in inviting *burgesses* from the towns, and that this was the commencement of our House of Commons.

First Year.—Henry the Second to Henry the Third. (See above.)

Second Year.—The Commonwealth.

Chief Points.—1. *Establishment of peace at home.*
House of Lords and Monarchy abolished. Executive Council of State formed. Various risings and disaffections by men who expected anarchy after the king's execution crushed by Cromwell—for example, Levellers, Agitators. Troops ordered to Ireland.

2. *Reduction of Ireland.*—Defeat of Ormond, storming of Drogheda and Wexford, defeat of Rupert's fleet, and defeat of Hugh O'Neill. Cromwell's policy—"cruel to be kind."

3. *Reduction of Scotland.*—Capture and execution of Montrose, landing of Prince Charles, Battle of Dunbar, Coronation of Charles, Battle of Worcester, completion of pacification by General Monk.

4. *Changes in Government.*

The Long Parliament—after "Pride's Purge," *The Rump.* England declared a Commonwealth, May 19, 1649. Parliament forcibly dissolved by Cromwell, April 20, 1653. *Barebone's Parliament*, July 1653. Instrument of Government drawn up by Council of State.

Parliament of 1654 dissolved in five months. Protector's sole rule till *Second Parliament*, September 17, 1656. Humble Petition and Advice. Cromwell as Lord Protector. Dissolution, February 4, 1658.

After Cromwell's death a *Short Parliament*, dissolved in April 1659. On May 7 the remains of the *Long Parliament* reinstated; expelled again October 13. Committee of Safety to December. Second restoration of the Long Parliament; dissolved, March 16, 1660. *Convention Parliament* met, April 14, 1660.

5. *Cromwell's Foreign Policy.* Spirited, patriotic, and successful.

(*a*) *Holland. Navigation Act*, 1651. War, 1652. Decisive victories of Blake. Peace concluded on advantageous terms. Flag to be saluted. Compensation paid.

(*b*) *Spain.* Demands made for free trade to South America and freedom of merchants from Inquisition. Attacks on West Indies. Capture of Jamaica, 1655. Capture of a Spanish Plate Fleet, 1656. Capture of Plate Fleet at Santa Cruz, 1657. Capture of Dunkirk, 1658.

(*c*) *France.* Alliance, 1654. Commercial Treaty, 1655, after liberty of worship had been granted to the Vaudois on Cromwell's insistence.

(*d*) Blake destroyed the Pirate Fleet off Tunis.

6. Note the cause of the sudden change after Cromwell's death—the usurpation of power by the army, and General Monk's action.

4. Geography.

Candidates.—England. Productions. Industries. Climate. The six northern and the east coast counties in detail.

First Year.—Germany, Switzerland, and Italy

Second Year.—Africa: British Possessions.

Draw maps of each country. Analyse and tabulate in note-books, for committing to memory, all necessary facts.

5. Arithmetic.

Candidates.—Vulgar fractions. Definitions of various kinds. Addition, subtraction, multiplication, and division, with proofs of these operations by means of diagrams.

First Year.—Simple proportion. Read up the theory carefully. Note the difference between ratio and proportion. "Ratio is the relation one number bears to another with respect to magnitude." Proportion is the equality of two ratios. For example, 3 : 5 is a ratio; As 3 : 5 :: 6 : 10 is a proportion. In a proportion the product of the first and last terms (*extremes*) = the product of the second and third (*means*). Hence when three terms are given it is always possible to find the fourth.

This must be clearly understood. Sums must be worked by proportion and method of unity. Note also that *ratio* only exists between quantities of the same kind. Thus—As 3 books : 6s. :: 4 books : 8s. is incorrect; it should be, As 3 books : 4 books :: 6s. : 8s. Neglect of this will frequently cause entirely wrong results.

Second Year.—Simple and compound interest. These are only special cases of proportion. All simple interest problems must be worked by method of unity, and NOT by formula.

Be quite sure you understand method to find (*a*) interest, (*b*) time, (*c*) rate, (*d*) percentage.

The best method of arranging compound interest sums is as follows:—

Find the compound interest on £4000 for three years at 10%.

Principal	= £4000
Interest for first year = $\frac{1}{10}$ of this	= £400
Principal for second year	= £4400
Interest for second year = $\frac{1}{10}$ of principal	= £440
Principal for third year	= £4840
Interest for third year = $\frac{1}{10}$ of principal	= £484
Amount at end of third year	= £5324
Therefore interest	= £1324

6. Euclid and Algebra.

First Year.—Euclid, Props. 5–8.

Algebra: subtraction and multiplication of easy quantities.

Second Year.—Euclid, Props. 34–38, with four deductions per week.

Algebra.—Addition and subtraction of easy fractions.

7. Music.

Candidates.—Accent. Two, three, and four pulse measure.

First Year.—Quarter-pulse tones and rests.

Second Year.—Names of chromatic notes. Principle on which they are named.

8. Teaching.

All Years.—Practise small letters on blackboard. Use a good copy book (*Practical Teacher Copy Book*).

Test Questions.

1. *Penmanship—All Years.*
Large Hand:—*Physiography.*
Small Hand:—*'Tis common proof that lowliness is young Ambition's ladder.*

2. *English.—Candidates.*—Analyse lines 148–155.
Parse—*that, what, to paint, unless, were given, to dip, far less.*
First Year.—Analyse and paraphrase lines 51–62.
Parse—*as, hoards, yet, pleased, to see, so small, hope, blest.*
Second Year.—Paraphrase and analyse (end of Scene 2):—
"Well, Brutus, thou art noble.....
He should not humour me."
Parse—*yet, may be wrought, 'tis meet, for who so firm.*

3. *History.—Candidates.—First Year.*
(*a*) Give an account of the Feudal System.
(*b*) What was the Domesday Book, and why and how was it compiled?
(*c*) What was the Investiture Dispute? how was it settled?
(*d*) In what way was Henry the First's reign favourable to the English?
(*e*) Give some account of the state of England during the Civil War.

Second Year.
(*a*) By what means did Charles raise money during his period of absolute rule?
(*b*) What were the immediate circumstances which led to the outbreak of the Civil War?
(*c*) Make a table of the chief battles fought, and the leaders on either side.
(*d*) What is meant by the second Civil War?

4. *Geography.—Candidates.*
(*a*) Describe a coasting voyage from London to Penzance, *or* from Penzance to Liverpool.
(*b*) Which are the chief plains of England?

First Year.

(*a*) Give some account of the government of France.

(*b*) Say what you can of the industries of Spain.

Second Year.

(*a*) What do yon know of the Congo Free State?

(*b*) What are the chief articles imported to and exported from the West Coast of Africa?

5. State some rules which you would give to children in writing the capital letters B, G, M, Q.

6. *Music.—Candidates.*—What is pitch, and what do you understand by the standard scale of pitch?

First Year.—Rewrite the following without change of key:—

d r m s ˢd m t, r f t, l, s, ᵈs m d

Second Year.—Name the intervals which each of the following notes makes with each of the others: **d m se l.**

SCHOLARSHIP COURSE FOR DECEMBER 1899.

The short time now at disposal will be used by all students in revising weak points, and taking a final look round the various subjects. Our space will be best utilised by calling attention to the chief points in each of the subjects of the syllabus.

1. *Penmanship.*—Daily practice in this must on no account be omitted. The sixty marks are earned more easily and quickly than in any other subject. Equal space, slope, and size are essential. Take care to finish each letter carefully; "painting," of course, is not permitted. Be sure to take your own pens with you.

2. *Dictation.*—Listen carefully while the piece is read, to get the general sense; this often assists in deciding the spelling of a word. Do not punctuate (excepting full stops) till the whole piece has been given out, and avoid putting in too many stops. Do not divide a word up between two lines; alterations and erasures will cause loss of marks.

3. *Composition.*—Select the subject about which you know most. Think it carefully over, and jot down a few heads under which to deal with it; allow at least five minutes for this. Write in a natural and simple style, avoiding repetition, bombastic talk, and slang. Allow a few minutes for revision. The correct way of setting about an essay should by this time be a habit. All students should be prepared to write an essay on The Trouble in South Africa and its Causes, Arbitration, Chinese Affairs, The Peace Conference, etc.

4. *English.*—In parsing, no abbreviation of less than *three* letters is allowed, and in all cases the word abbreviated must be perfectly clear. For example, *dist.* may mean *distinguishing* or *distributive*, and is ambiguous. Take care not to omit the syntactical relations, and parse *fully*. For example, "Easy to learn." "*To learn* = Infinitive Mood" will not do. It must be: "Verb, Regular, Intrans., Infinitive Mood, limiting *easy*." A somewhat detailed account of the authors of the special books, the literature of their period, etc., should be prepared.

5. *Arithmetic.*—Theory is of great importance. All should be known; but G.C.M., L.C.M., Vulgar Fractions, Decimals, Ratio, Proportion, and Percentages are favourite points.

In working the paper do not hurry. Make sure that your answer is a *possible* one, and prove the accuracy of your working if you can. Thus, in a question, "How long will it take £1735 to amount to £2200 at 5 per cent.?" work it mentally, thus:—The interest per annum would be roughly £86; the total amount gained, £500. Therefore the answer must be *about* six years. An answer of two years or twenty years *cannot* be right.

State the sum clearly, and show the reason for each step. The sum should read continuously from the commencement to the end. "Figures without words" is rarely enough. In many sums it is necessary to draw a diagram to make the meaning of the question clear. Neatness as well as accuracy is essential.

6. *Mathematics.*—The theory of Factors, G.C.M., L.C.M., Quadratics, should be revised; the formulæ in Algebra and Mensuration committed to memory. Regular practice in writing out Euclid against time should be taken, all references, etc., being inserted. Frequently the letters A to G are not allowed. The abbreviations used must always be perfectly clear.

7. *Geography.*—The Memory Maps should be thoroughly learned. Clear, bold examples should be aimed at rather than the presentation of a mass of details.

The interchange of productions between the colonies and the mother country should be noted, and also the forms of government in the colonies and dependencies. Australian federation is a likely topic, so is the Venezuelan frontier, the Royal Niger Company (which transfers its political powers to the Imperial Government at the end of this year), the state of the West India trade, and, of course, the troubles at the Cape.

In answering the questions, facts must be stated. Hazy generalities are of little use.

8. *History.*—The important statutes should be thoroughly known. Constitutional and social progress is also important. The special period must be prepared as exhaustively as possible, and every book bearing on it, to which there is access, read.

9. *Teaching.*—The paper on this subject is often deceptive. Ordinary experience in school is hardly enough to answer the questions; the reasons for various processes must be shown.

10. *Music.*—Every student should take this paper, and attempt the practical work. The questions are very simple, and the papers vary but little from year to year.

11. In the other optional subjects—*Language*, *Science*, and *Drawing*—the average pupil teacher can easily score more than the 25 per cent. minimum needed. There are no particular points requiring special mention. Care must be taken with the retranslation in the Language paper. The Freehand will be the ordinary outline of ornament.

In conclusion, it only remains for me to point out a few rules which should be carefully observed at the examination itself:—

1. Provide yourself with everything that is likely to be needed, including your permission to sit.

2. Allow more than enough time to get to the place of examination.

3. Before commencing to answer the paper, fill in the form on the outside of the book.

4. Read very carefully the instructions given with each paper.

5. Divide your time between the questions in proportion to their importance.

6. Attempt all compulsory questions.

7. Sketch out each answer before commencing to write, and revise carefully when it is finished.

8. Avoid all discussion of papers when they have been worked. If you compare answers with others, you will be sure to be discouraged.

9. Do *no* study during the examination week.

10. Avoid confusion, keep cool, and if any paper is not to your liking, endeavour to make up for it in other subjects.

To my numerous correspondents I wish every success.

CORRESPONDENCE: RULES.

To ensure an answer in the next issue, queries must be sent by the 15th of each month.

Name and address of sender, with coupon of current number of THE PRACTICAL TEACHER (and *nom de plume* if desired), must be enclosed.

As a rule, all replies will appear in the Correspondence Column; but any one desiring an immediate reply may obtain it by enclosing a stamped addressed envelope.

All communications and queries with regard to the PUPIL TEACHERS' AND SCHOLARSHIP COURSE should be addressed to "Mr. A. T. FLUX, The Bays, Belvedere, Kent."

ANSWERS TO CORRESPONDENTS.

G.D. (*Tow Law*).—Penmanship, 50/60; *l* and *b* should be looped. Essay, 17/20. Drawing, 19/20

Heather.—Penmanship, 55/60.

Douglas.—Penmanship, 50/60.

Poppy.—Penmanship, 45/60. Loop letters in large hand; use a finer pen in small hand. Very good style, but lacking in freedom and delicacy.

Dorothée.—Essay, 60/60. Very good.

E.O.S.—Penmanship, 25/40. Ugly style. Grammar, 10/20. Many mistakes, too numerous to mention. When sending up such answers you should enclose stamped envelope for their return. History, 8/10. Geography, 7/10. Essay, 15/20.

Thistle.—Essay, 55/60. Carefully thought out, and well expressed.

Idris.—Essay, 42/60. Lacking in polish. Penmanship, 50/60.

Ivy.—Penmanship, 25/60. Very poor. Practise from a good model. Essay, 40/60. Ideas good, but not expressed in good English, too many colloquialisms.

Chon Kind.—I do not know what time will be allowed for the subjects. Penmanship, 50/60. Essay, 56/60. Very good.

Widnes.—Penmanship, 32/40. Grammar, 8/10.

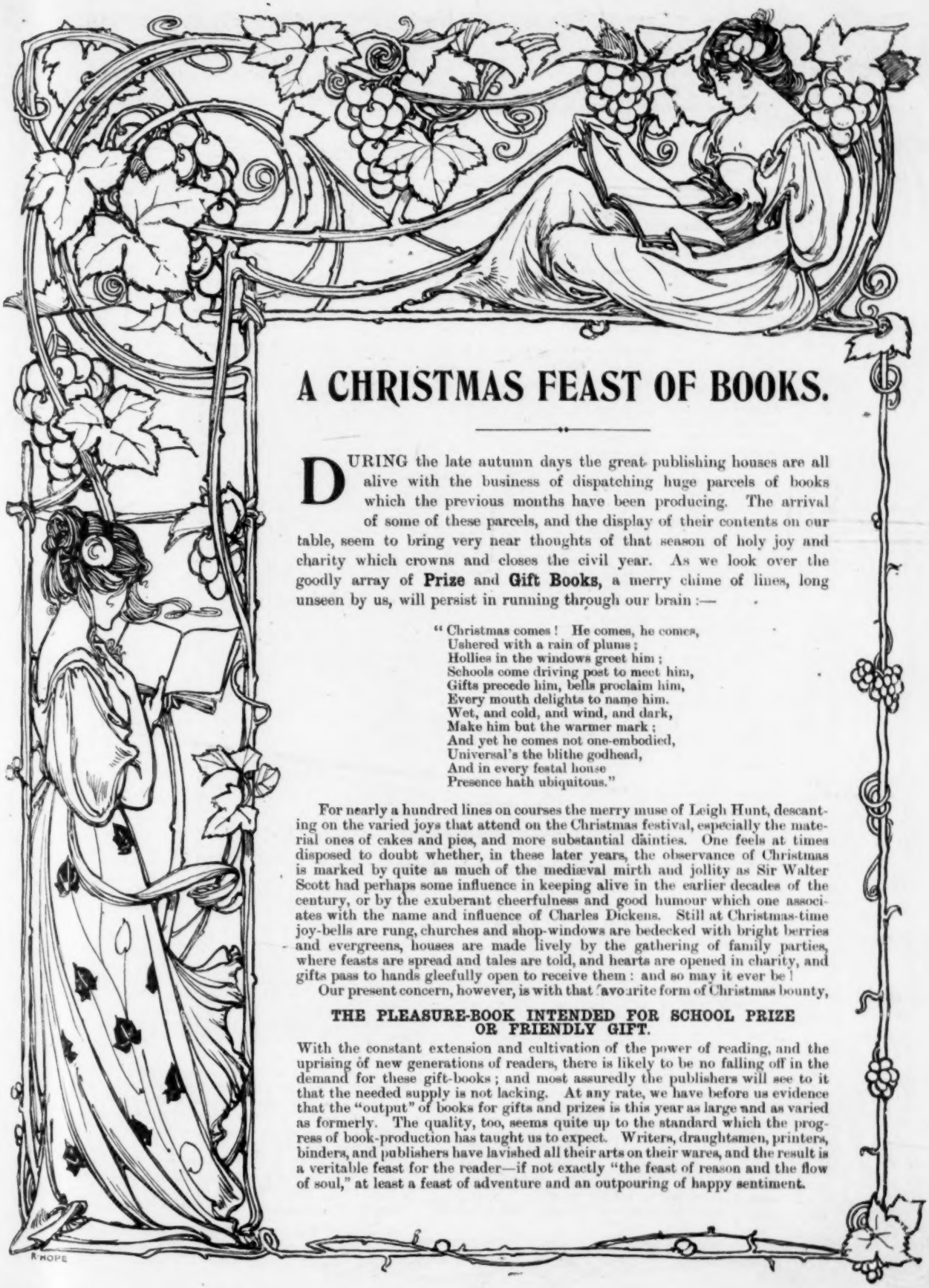
Pleiades.—Essay, 55/60.

Lynher.—Essay, 30/40. Lacking in vigour. Penmanship, 25/40. Use a finer pen, and pay much more attention to detail and finish.

Badger.—Penmanship, 20/40. Grammar, 7/10. Composition, 33/40.

Correspondents sending up exercises in grammar should enclose a stamped addressed envelope. It is impossible to point out all errors in this column.

Other Correspondents' answers by post.



A CHRISTMAS FEAST OF BOOKS.

DURING the late autumn days the great publishing houses are all alive with the business of dispatching huge parcels of books which the previous months have been producing. The arrival of some of these parcels, and the display of their contents on our table, seem to bring very near thoughts of that season of holy joy and charity which crowns and closes the civil year. As we look over the goodly array of **Prize** and **Gift Books**, a merry chime of lines, long unseen by us, will persist in running through our brain :—

> "Christmas comes! He comes, he comes,
> Ushered with a rain of plums;
> Hollies in the windows greet him;
> Schools come driving post to meet him,
> Gifts precede him, bells proclaim him,
> Every mouth delights to name him.
> Wet, and cold, and wind, and dark,
> Make him but the warmer mark;
> And yet he comes not one-embodied,
> Universal's the blithe godhead,
> And in every festal house
> Presence hath ubiquitous."

For nearly a hundred lines on courses the merry muse of Leigh Hunt, descanting on the varied joys that attend on the Christmas festival, especially the material ones of cakes and pies, and more substantial dainties. One feels at times disposed to doubt whether, in these later years, the observance of Christmas is marked by quite as much of the mediæval mirth and jollity as Sir Walter Scott had perhaps some influence in keeping alive in the earlier decades of the century, or by the exuberant cheerfulness and good humour which one associates with the name and influence of Charles Dickens. Still at Christmas-time joy-bells are rung, churches and shop-windows are bedecked with bright berries and evergreens, houses are made lively by the gathering of family parties, where feasts are spread and tales are told, and hearts are opened in charity, and gifts pass to hands gleefully open to receive them: and so may it ever be!

Our present concern, however, is with that favourite form of Christmas bounty,

THE PLEASURE-BOOK INTENDED FOR SCHOOL PRIZE OR FRIENDLY GIFT.

With the constant extension and cultivation of the power of reading, and the uprising of new generations of readers, there is likely to be no falling off in the demand for these gift-books; and most assuredly the publishers will see to it that the needed supply is not lacking. At any rate, we have before us evidence that the "output" of books for gifts and prizes is this year as large and as varied as formerly. The quality, too, seems quite up to the standard which the progress of book-production has taught us to expect. Writers, draughtsmen, printers, binders, and publishers have lavished all their arts on their wares, and the result is a veritable feast for the reader—if not exactly "the feast of reason and the flow of soul," at least a feast of adventure and an outpouring of happy sentiment.

In our Prize-book Supplement last year, we singled out for special prominence the valuable work **The Teachers' Bible, with The Illustrated Bible Treasury**, of which some particularly handy and attractive editions had been then recently published at very moderate prices. These have found much favour with the class for whom they were intended; and as they are, of course, still available, they are likely to continue to attract attention.

On this occasion we venture to make special mention of another class of work eminently suited for a seasonable present. There are many persons who do not share in the common craving for the newest of new literature. On the principle that "the best of friends is an old friend," they pin their faith to the authors and books that have stood the test of time. And who among authors of established reputation is more likely to be called up by thoughts of the Christmas season than the one already named in this article—Charles Dickens? It is sometimes argued that his star is on the wane; but there are striking facts that tell the other way. His works continue to be produced in edition after edition in seemingly endless variety, and books about him and his writings are published and read with avidity. Some of us who read him in our youth with unmeasured delight may not be able to enjoy to the full his bubbling merriment, his humour, his pathos; but new generations of young folks swell the ranks of his admirers, and so the Dickens boom is one of lasting reverberation.

"NO SURRENDER." (Blackie and Son.)—*See p. 307.*

As originally issued, the novels of Charles Dickens formed bulky volumes; and even with the more crowded pages of later editions, their length has caused them to be rather weighty. Now it is natural that the reader of pleasant fiction should welcome as many helps to ease in reading as can be offered him. And one help has been sought in reducing the size and weight of the volumes. This has been effected in some cases by the division of the works into two or more handy volumes; in others, by the use of diminutive type. This season, however, a better way has been found, and we note with pleasure the remarkable new departure made in the **New Century Library** of Messrs. T. Nelson and Sons. The first volume contains the immortal **Pickwick Papers**. Here in a single small volume, measuring 6½ inches by 4¼ inches, and scarcely more than half an inch thick, we have the whole of this work. At first one wonders how this is managed. It is certainly not by the use of small type. If it were, we could not so heartily commend the edition to our readers; for we recognise, as they also are likely to recognise — especially if they have had to apply tests of eyesight to large numbers of children — how serious a matter is the employment of minute type that must be trying and injurious to the eyes. No; here the type is of the size technically known as *longprimer*, which is commonly used in modern works of full octavo size—as large as the largest type used to give prominence to the most important articles in this journal. The secret is the use of the **"Royal" India Paper**, the thinnest printing paper in the world—a paper so thin that the 850 pages of this volume are only half an inch in thickness! This paper at the same time is perfectly opaque, of smooth surface, very tough, and very light.

Thus the lover of Dickens can now carry in his pocket a work which combines all the advantages a reader can wish for, even in an *edition de luxe*. There is, of course, another obvious advantage in the

small size of volume, as the works of standard authors in such form take so much less room on our library shelves. The binding, we should add, is extremely tasteful—the cheapest being in neatly-stamped red cloth covers, with pretty gilt backs and gilt edges. The work may also be had in limp leather or in limp boards, and the price varies from two to three shillings, according to the style of binding.

The Pickwick Papers is the first volume of a series intended to include not only the works of Dickens, but also those of other standard writers of fiction. Already have appeared **Nicholas Nickleby, Oliver Twist** and **Sketches by Boz,** and Thackeray's **Vanity Fair.** These will be added to at the rate of two volumes per month.

"BOYS OF THE PRIORY SCHOOL." (Blackie and Son.)

BLACKIE AND SON.

No Surrender: A Tale of the Rising in La Vendée. By G. A. Henty. The rising of the Vendeans at the time of the French Revolution was a vigorous protest against the invasion of their political and religious rights as freemen. They represented that solid substratum of the French nation which is its main support. The frothy, hysterical, and sceptical utterance of the press and the cries of the Parisian mob never represented the thoughts of millions of thrifty, religious, and hard-working peasants; and this is well illustrated in this story, which emphasises the difference between the peasants and the armies of the National Guard.

Leigh Stansfield, an English youth, accompanied his sister, who had married a Frenchman, to Nantes. On the outbreak of hostilities he organised a body of scouts which was of great service to the Vendeans. He distinguished himself by his bravery and resource, fought in nearly all the battles, rescued his sister from the clutches of the Republicans, and only retired to England when the cause was hopelessly lost.

This prize is brimful of interest and instruction, as all Mr. Henty's books are.

Boys of the Priory School. By Florence Coombe. This is a typical tale of public school life—its fun, interests, temptations, and heroisms. The school hero is shown to be less noble than his companions think him, while his somewhat despised cousin exhibits unexpected pluck in refusing to "split" on his schoolfellows.

The boys introduced to the reader are "nice" boys, with an unusual talent for quotation, and the faculty of talking and acting three or four years in advance of their age.

The tale is not convincing—the fact is that none but an old boy who has been through it can describe boys' life in school—but it is brightly written, and very interesting.

A Roving Commission; or, Through the Black Insurrection of Hayti. By G. A. Henty. Mr. Henty can always be relied upon to contribute his quota of prize books for boys—books which provide instruction as well as delightful reading. He is "historiographer-in-chief" for young people, and from his prolific pen flows volume after volume of historical novels, till one begins to wonder what will happen when all the incidents of history are used up. This must be well over the fiftieth book of Mr. Henty's we have read, and we do not remember a dull page anywhere.

The volume before us gives a graphic account of the rising of the blacks in Hayti under Toussaint l'Ouverture. The hero is a middy, who, after displaying the greatest courage in rescuing a girl from a ferocious bloodhound, wins promotion by taking a prominent part in discovering and smashing up a pirate slave depôt. He then rescues the same girl and her mother from the blacks, and obtains a roving commission to coast round the island and give assistance to any of the white population who need it. During the cruise he captures a pirate and retakes a merchantman, and finally, in a ten-gun craft, surprises and takes a French

thirty-six-gun frigate. For this he is sent home in the captured vessel as temporary commander, and the Admiralty confirm his rank as captain. The book is handsomely bound and well illustrated.

With Shield and Assegai: A Tale of the Zulu War. By Captain F. S. Brereton, R.A.M.C. We congratulate Captain Brereton on the opportune appearance of his book. Coming to us at a time when every eye is turned towards South Africa, it gains additional interest from the fact that much of its incident occurs in what is, as we write, the seat of the present war.

Suitably bound and well illustrated, the book is one which most boys would be glad to possess.

Won by the Sword. By G. A. Henty. This story is a sort of sequel to *The Lion of the North*. The narrative, however, is quite independent in its character.

The plot is founded upon the later campaigns of the famous Thirty Years' War, in which France took the leading part instead of Sweden. In his well-known captivating style, Mr. Henty interestingly traverses the history of the time. The book deserves wide popularity, and will doubtless be in great request as a prize for boys this season. The printing, binding, and illustrations leave nothing to be desired.

Wynport College: A Ta'e of School Life, by F. Harrison, tells of the adventures, or rather the misadventures, of a home-bred boy, pampered by a weak but fond mother, and afterwards brought in contact with the small though exacting world of a boys' school. His experiences are amusing, though we are somewhat afraid the hero is lost in the more interesting individuality of one Patrick O'Flahertie, who, with his merry tricks and quaint remarks, lends a brightness to the book which it otherwise would miss. It is well written, illustrated, and printed, and will doubtless commend itself to the peculiar boy-world it is so palpably intended to cater for. We can safely recommend it to the notice of those who seek to give innocent pleasure to their young friends at this festive season of the year.

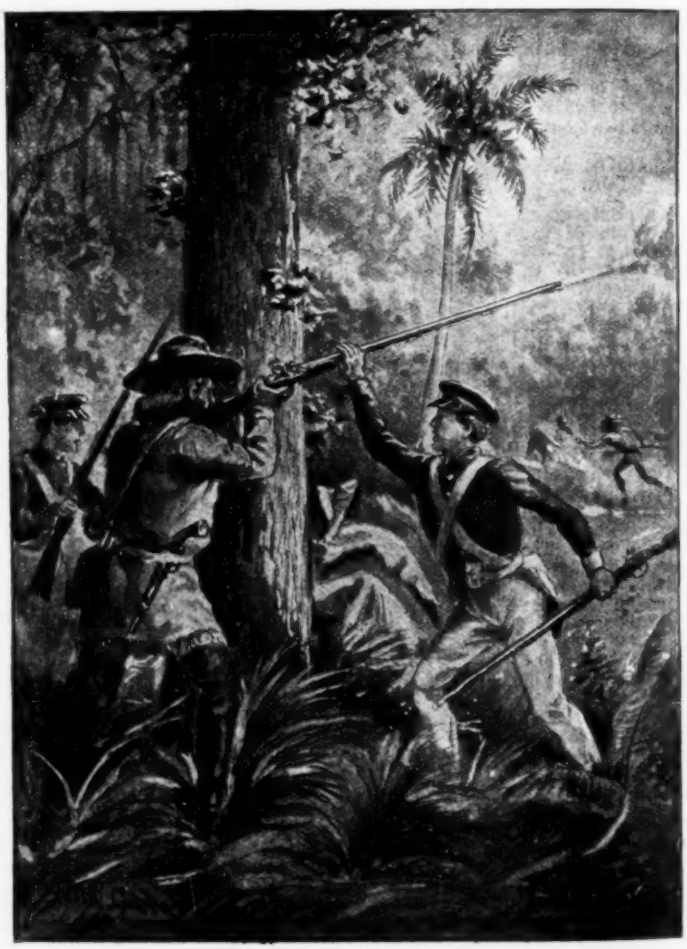
BURNS AND OATES.

Clement of Rome, and other Tales of the Early Church. By Rev. John Freeland. This is a dull book. The incidents are hidden beneath masses of commonplace conversations, and the descriptions lack warmth and reality. There is plenty of material in these old stories to make a fascinating book, but the author is not happy in his treatment. The legend of Westminster Abbey is one of the stories which rouse most interest.

CASSELL AND CO.

The New Penny Magazine. The volume before us contains thirteen penny numbers of the new magazine. As each number contains sixty pages of profusely illustrated matter, it may well be asked, "How can it be done for the money?" A serial story runs throughout. Then there are short stories and descriptive articles on famous men, famous places, and famous things; articles antiquarian, scientific, and humorous; and all by famous writers. In short, it is decidedly one of the best and cheapest magazines published. One need not be in doubt as to the selection of a prize book whilst a volume of *The New Penny Magazine* is in evidence.

In Red Indian Trails; or, Osceola, Chief of the Seminoles. By Edward S. Ellis. This is a good book of boys' adventures in a time and locality not very familiar to English readers. The scene is Florida, the date 1835, the historical basis the desperate struggle of the Seminole Indians, reinforced by negro refugees, to expel and exterminate the white settlers. The numerous hairbreadth escapes of the cousins Jack and Dick, in descending a river amid Indians and wild beasts, are well told. The critical question is how far personal



"IN RED INDIAN TRAILS." (Cassell and Co.)

friendship will prevail over race hatred in their relations with the fierce chief Osceola. The boys come off safely; but the writer carries on the tale to the mournful end, not disguising the treachery and cruelty that stained the American as well as the Indian side. We are told, however, that at last the Seminoles earned the name of civilised. Except that the United States is spoken of as "our country," there is little or nothing to mark the book as American in style.

Familiar Wild Flowers. By F. E. Hulme. This is the sixth volume of Mr. Hulme's delightful series. Among the old familiar friends in this volume we find the water-lily, the golden rod, the ox-tongue, cotton grass, thyme, dog-violet, meadow-sweet, columbine, lesser-periwinkle, traveller's joy, and a host of others. The coloured illustrations are particularly graceful. The dog-violet, the chamomile, the columbine, and lesser-spearwort are especially natural and beautiful. The information Mr. Hulme conveys is interesting, accurate, and full of literary suggestions. The book recalls many sunny memories of roadside and hedgerow. We warmly recommend it to teachers and all who love wild flowers.

Peril and Patriotism.—These two volumes contain a large number of true tales of heroic deeds and startling adventures. They are prefaced by a special introduction from the pen of Mr. H. O. Arnold Forster, M.P. Many of our readers are doubtless familiar with Mr. Forster's well-known educational works, and those who have enjoyed the fascinating pages of his *British History* and *Citizenship* will not need to be assured of the worth and merit of anything appearing in connection with his name. The stories, by various writers, and drawn from many sources, are really important pictures from life's experience, and as such might well be named the nation's gallery of golden deeds.

Senior boys and girls, who would be more than pleased with these volumes, could not fail to learn and take to heart the splendid object lessons on courage, self-sacrifice, self-control, endurance, etc., from these chapters on peril, adventure, and heroism.

The volumes are well bound, profusely and appropriately illustrated. They are excellent prizes, and ideal books for the school library.

Chums.—A new volume of this popular paper for boys has just appeared. It is, as heretofore, replete with interesting and thoroughly entertaining matter of the kind likely to give the highest satisfaction to our boys. There are a large number of well-written complete and serial stories by authors of distinction, as well as general articles on a variety of interesting subjects: Famous People and their Pets; Five Minutes with the Famous; Heroes from Public Schools; Railway Scenes and Stories; Illustrated Interviews with Distinguished Men; Scenes under many Skies, pictured by the pen and camera; Pets, Cameras, Chess, Puzzle Columns, etc.

The volume is well and strongly bound in an attractive cover, abundantly illustrated, and contains in addition many excellent photographic reproductions of well-known personages. The several coloured plates presented are of exceptional beauty and worth.

W. AND R. CHAMBERS.

"THE BOYS AND I." (W. and R. Chambers.)

The Boys and I. By Mrs. Molesworth. "I" is Miss Audrey Gower, aged nine, and "the boys" are her brothers Tom and Racey, aged seven and six respectively. They have a very happy childhood, and their first cloud comes when father and mother are called to leave them for several years owing to an appointment in China. The three children are sent to live in London with Uncle "Geoff" and his housekeeper Mrs. Partridge.

The usual conflict very soon opens between this most original and delightful trio of children and the said housekeeper, who knows as little about children as the good-natured Uncle Geoff; so "the boys and I" have a lively experience.

Their ingenious and innocent attempts to amuse themselves almost always end in unforeseen disaster, and bring upon their devoted heads the denunciations of the terrible Mrs. Partridge. Every child who reads this book will wish to imitate their novel attempt at securing toast for tea under difficulties. The secret as to how "the boys and I" obtained a new auntie must be left to the reader's discovery.

Mrs. Molesworth loves and understands children, and draws them with

a light and pleasing fancy. Little Audrey will hold a high place in the esteem of all her readers.

Yap-Yap. By Edith Kenyon. A neat little volume in green cloth. The story is about a little boy who made a pilgrimage to St. Paul's Cathedral.

Molly and Mother and **Daddy's Darling** are two other little volumes of the same series. They are simply and brightly written.

The Spy in the School: A Tale of Two Chums. By Andrew Home. With six illustrations by W. J. Urquhart. This very amusing tale is so full of incident, drawn from the most varied situations, that any boy who is lucky enough to receive a copy of it will be sure to say "it's jolly," and any girl (and what girl nowadays does not prefer boys' books to her own?) will declare it to be "lovely."

The six large illustrations are specially good, and the one in which Major Robins captures poor Smithers is not the least attractive. The smaller illustrations are pretty little bits of rural scenery.

Princess and Fairy; or, The Wonders of Nature. By Lily Martin. Sixty-eight illustrations. This is a very brightly written little book, well suited to children whose interest has been aroused in elementary science and in nature lessons. Girls more especially will thoroughly enjoy following the little princess from her palace home into the country, where she is to have a six months' holiday from books. The fairy who appears on the scene is not a fairy god-mother, but a gentle, graceful lady whom the name quite befits, and who introduces the royal little lady into the fairyland lying everywhere around her.

The girl-reader between the ages of ten and twelve will feel as sorry as the little princess felt when, in the last chapter, a letter is received from the queen which recalls her daughter home, and will perhaps be surprised to hear the fairy say that wonders lie everywhere around us, in the town as well as in the country. All the pictures are good; but those that are purely scientific—as the camel's foot, the sheep's teeth, the cat's paw, and the foot of a hen—are excellent, being quite free from unnecessary detail. Altogether this is a capital gift book for either girl or boy.

Light o' the Morning. By L. T. Meade. This is what the average schoolgirl in her teens would call a lovely book. It is an Irish tale, with typical Irish characters, showing very clearly and well their peculiar and almost bigoted love for the land and home of their birth. The heroine, a young and beautiful girl, finding that her father's misfortunes have jeopardised the last bit of the large O'Shanaghgan estate, seeks to reclaim it, eventually succeeding, though at the expense of the much-regretted manners and customs which had been almost life to the old squire.

The book has a bright, happy vein running through it which appeals very forcibly to the reader, a good moral tone which will tend to elevate, and in addition inculcates good, sound common-sense.

Well printed on good paper, with a few but good illustrations, we can confidently recommend it to those who are desirous of placing a good readable book in the hands of the young.

Mabel's Prince Wonderful; or, A Trip to Storyland. This book, by W. E. Cule, is a delightful Christmas present for a little girl. To one who has read the old-world stories, the experiences of little

THE TALKING THRUSH." (Dent and Co.)—*See p. 311.*

Mabel, who falls asleep and goes through them all over again, will make very pleasant reading for Christmas time. She will find her old favourites as new and real as ever. The suggestive drawings by W. G. Mein add much to the attractiveness of the book, which is got up in a style that does great credit to the publishers.

Fix Bayonets! or, The Regiment in the Hills. By G. Manville Fenn. Illustrated by W. H. C. Groome. A stirring story of a regiment in the Indian hills, recalling some of the incidents that made our morning papers so interesting a year or two ago. The brave young Englishmen have to travel by a very rough path to meet some natives on a plain, and are stoned as they march by enemies who are on the heights. Private Gedge and Lieutenant Bracy, the heroes of the tale, are much attached to each other, and together go through terrible dangers with the greatest bravery. The former, injured by a great piece of rock falling on his helmet, refuses to be carried, and continues in line. Later on, both lieutenant and private find themselves in a small hospital—the former terribly hurt in the back, where a piece of iron is lodged, which the doctor fears to remove lest fatal consequences follow. But the unexpected happens when the hospital is attacked by some natives, and the wounded men must fight or die. Fortunately the fight means life to both, and doubly so to Bracy, whose exertions dislodge the piece of iron that had made the doctor so anxious, and the invalid begins to rally. There are other exciting scenes just to a boy's taste. The book is eminently a book for boys in their teens; indeed, we should not be surprised to find it in the hands of young soldiers.

J. M. DENT AND CO.

The Talking Thrush. Collected by W. Crooke, and retold by W. H. D. Rouse. This is a collection of Indian stories taken from the lips of the jungle folk of Mirzapur and from the teachers of village schools. The stories are chiefly animal stories. Some of them are wildly fantastic—as, for example, the story of the cat that swallowed five hundred cakes; the parrot; the old woman; the washerman and his donkey; the king, his bride and wedding procession, and a fine row of elephants; and lastly, two land-crabs. The shrewdness and cunning of the animals remind the reader of Brer Rabbit. "How the Mouse got into his Hole" is a variation of "The Old Woman and her Kid." "The Farmer's Ass" is one of the best stories. The farmer shaves his head and mourns for his pious ass, named St. Anthony. The grocer, the soldier, the whole regiment, the general, the prime minister, and the king follow his example. "Who is St. Anthony?" asks the queen at last. Then everybody discovers they have been mourning for an ass. The book is handsome, and the illustrations are quaint and characteristic.

Children will love these stories, and the student of folk-lore will find much to interest him in them.

"CROSS PURPOSES." (Griffith, Farran, Browne, and Co.)—*See p. 312*

Mrs. Leicester's School. By Charles and Mary Lamb. Illustrated by Winifred Green. Much we hope that our young people have not yet voted Charles and Mary Lamb too old-fashioned, for here is an *edition de luxe* from the hands of Messrs. Dent of a delightful old story, which, from an adult point of view, is the very thing for them. The varied tales told by ten of Mrs. Leicester's pupils, beginning with that of the fine-hearted sailor-uncle of Elizabeth Villiers, and ending with the voyage of Arabella Hardy, contain some excellent precepts hidden cunningly away. The Lambs were writing during our most exciting naval times, and meant to do what they have here done—that is, hold out the British tar in his twofold character of brave hero and gentle friend. And they were writing, too, when witchcraft was not quite an exploded thing, and this makes the story of "The Witch-Aunt" good as a bit of history for a child. The coloured pictures are most charming; and, with head-pieces and tail-pieces, the pictures in all are thirty-nine.

The Jamesons. By Mary E. Wilkins. Messrs. Dent give us here another of his dainty books for girls and their seniors not far removed. The tale it contains is very amusing,

and fits in with the merry seasons for which it makes its appearance.

The pictures are few but well coloured, and match the text in humorousness.

GRIFFITH, FARRAN, BROWNE, AND CO.

Shipmates; or, Adventures in the Merchant Service. By Hugh St. Leger.

The Castaways: An Ocean Romance. By Harry Collingwood.

Cross Purposes. By Emma Marshall.

The Little Lady of Lavender. By Theodora C. Elmslie.

Our Soldiers. By W. H. G. Kingston.

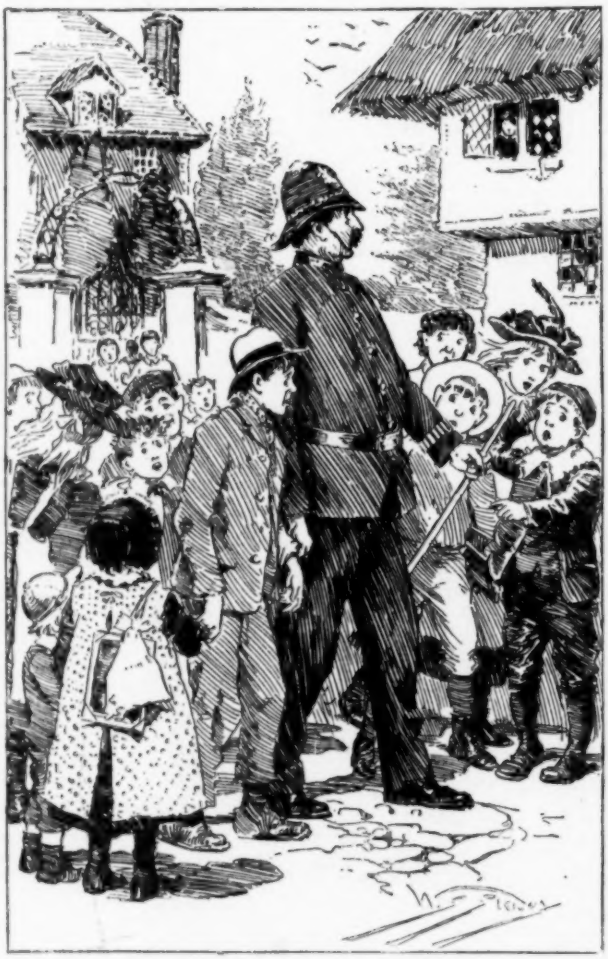
His Little Royal Highness. By Ruth Ogden.

Black Puppy. By Theodora C. Elmslie.

The Old Pincushion. By Mrs. Molesworth.

[We regret that Messrs. Griffith, Farran, Browne, and Co.'s new books arrived too late to be all reviewed in the present number. We are able to give brief reviews of the first three; the others will be noticed in our next number.—Ed.]

Shipmates; or, Adventures in the Merchant Service. By Hugh St. Leger. If life in the merchant service is half as merry as Mr. St. Leger depicts it, we can well understand why boys run away to sea. Fun and frolic seem to be the chief business of the boys to whom we are introduced; and when they have successfully escaped from the punishments they deserved for their practical jokes, and also from the dangers which subsequently befell them, to find a rich uncle at the end of it all puts a fascinating climax to the tale, and almost makes us wish to be young again. We fear, however, that the life at sea is rather highly coloured; but the author set out to write a bright, merry tale, which should appeal strongly to the dash of Viking blood to be found in all British boys, and he has undoubtedly succeeded. Few lads will be willing to put the book down till it is finished. The binding and illustrations deserve a special word of commendation. The whole forms an ideal prize book.



"A SUNDAY IN SUMMER." (National Society.)—*See p. 314.*

Cross Purposes. By Emma Marshall. Mrs. Marshall was only able to finish the first ten chapters of this book when English girls lost an old friend, who had written for them many a pleasant and instructive tale. The story has been ably completed by Miss E. Everett-Green.

This is one of those charming tales of English rural life which leave the same impression on us as does a holiday in some quiet village. We become familiar with the various characters—they live for us: we follow the threads of their lives with interest as well as curiosity; we rejoice in their happiness, and sympathise with them in their troubles; and we put the book down with regret that we cannot continue further the acquaintance we have made.

It is one of the best tales we have read for a long time.

The Castaways: An Ocean Romance. By Harry Collingwood. Mr. Collingwood's breezy sea yarns are as keenly appreciated by young people as Clark Russell's are by their seniors.

The hero of this tale is a Lieutenant Conyers, who sails for India. He acts heroically in swimming in a heavy sea to a sinking vessel to effect a communication, and saves the lives of all the crew. Soon after the vessel in which he sails is sunk, but he succeeds in saving himself and a young lady, who up to that time has snubbed his friendly advances. After several days in an open boat, they meet with a derelict, and are instrumental in rescuing a shipwrecked crew who are in dire distress. When these recover, they show their gratitude by seizing the ship, and compelling the hero to navigate it to an island where they know there is a hidden treasure. The possession of this treasure causes much quarrelling and bloodshed, from which the hero and the young lady escape, and are picked up by a British man-of-war. Needless to say, before this they have fallen deeply in love with each other, and their marriage ends the book happily.

The latter part of the tale is strongly suggestive of *The Wreck of the "Grosvenor."*

The book is brightly written, handsomely bound, and well illustrated.

JARROLD AND SONS.

Greta. By Ada Mary Kowley. A sub-title to this book would be "Love at Cross Purposes." Somehow *love* will have its own sweet way, whatever the match-makers may do. Greta is a sore puzzle to her conventional relations, and also to her would-be admirers, who, it must be confessed, are a feeble set, always excepting Paul Noble, whose whole-hearted devotion to the service of his Master and the poor of the London parish in which he is a missioner gives real character to the story. Paul fails to win Greta's affection, for a reason which is apparent from the outset; but he succeeds in rescuing her from the gloom of agnosticism, and convincing her that a useful and worthy life is to be found only in the service of Christ.

LONGMANS, GREEN, AND CO.

Yuletide Yarns. Edited by G. A. Henty. When a new book presents its card and requests admission, we naturally glance first at the name of the author of its being. "By G. A. Henty" is a passport to the very best book society; but when, as in this case, its authors are many, possessing such well-known names as Henty, J. Bloundelle Burton, C. W. Whistler, Lieut.-Colonel Percy Groves, Leighton, David Ker, Fred. Whishaw, Harry Collingwood, E. F. Pollard, and George Manville Fenn, we give it more than a hearty welcome, and respectfully bow it into the front reserved seats. There is no need to ask any inquisitive questions, nor should we dare to refuse it admission. It is, besides, clad in the best style and in perfect taste.

When we make a closer acquaintance and hear what it has to say, the tale, or rather series of tales, is so entrancing that we listen spellbound, and as soon as the recital is over beg to hear it all through again.

As we are not selfish, and have no wish to monopolise a good thing, we have very much pleasure in introducing to our readers, with the earnest request that they will in turn introduce to their young friends, *Yuletide Yarns*, one of the very best and most entertaining books of the season.

To summarise the contents is impossible without utterly spoiling the effect, and we do not therefore attempt it.

MACMILLAN AND CO.

The Bravest of them All. By Mrs. E. Hohler. Four orphan children, who have been badly brought up by unsympathetic relations, are sent into Scotland on a visit to an unknown aunt. An ancient feud has existed between their mother's ancestors and another Scotch family. The children, whose heads are full of romances, affix the following warning to a tree, for the young MacCullochs to read:—

"*To the Clan MacCulloch.*

"We, the undersigned, do hereby give you warning that we intend to continue the feud between our mother's clan and yours, and will resist any attempt to trespass on this land to the last drop of our blood. So beware.

"Given under our hand and seal.

"Rupert Darnley.
Barbara Darnley.
Lance Darnley.
Dick Darnley."

"THE BRAVEST OF THEM ALL." (Macmillan and Co.)

The influence of Aunt Hester and the gentleness and heroism of the delicate boy Alan finally teach the young Darnleys that "never in the world does hatred cease by hatred," and that

"Peace hath her victories
No less renowned than war."

There is a flavour of Mrs. Ewing about the children in this book which recalls our childhood's memories.

METHUEN AND CO.

Tommy Smith's Animals. By Edmund Selous. This is a tiresome book: the situations are artificial, the descriptions tedious, and the morals strained. Tommy is an unattractive little boy who delights in torturing animals. The beasts decide to teach him to be kind by telling him about their own usefulness and cleverness. The frog treats him to some facts of natural history; the rook is didactic on the subject of cockchafers; the rat conjures with eggs and oil-cans for his edification; the hare describes his agility in doubling; and the grass-snake, the wood-pigeon, the peewit, and the barn-owl all read him moral lessons. The illustrations

lack simplicity and vivacity. Complicated descriptions like that of the interior of the mole's palace require simple diagrams to make the point clear. The attempt to combine instruction and morality by means of a story, in this instance, is not happy.

THE NATIONAL SOCIETY.

Guy's Duty. By Penelope Leslie. Guy and his sister Winnie accompanied their parents on a visit to Bombay. A precocious and interesting pair, their sayings and doings make quite an attractive little volume. As the elder, Guy was not always equal to the responsibility of taking care of Winnie, but he nobly performs his duty in the amusing chapter which describes the total eclipse of the sun as seen at Juer. *Guy's Duty* will be a favourite prize for young children.

A Sunday in Summer. By A. E. Deane. This is a capital prize book for boys. Joe Gilby, the bully, and Willie Minster had a free Sunday—in other words, played truant from church. The difficulties they made for themselves and others as a result form subject-matter for a good story pointing an excellent moral. Jim, the invalid boy, who made a heroic attempt to avert the catastrophe caused by the two truants, is a really well-drawn character.

A King's Thegn. By Geraldine M. Gay. A story, as the title implies, of the Saxon times, and of the period of the good King Alfred. Edgar, the king's thegn, tells his own story, during which we get spirited accounts of Alfred's camp in Athelney; of the battle of Ethandune; of Saxon customs; and the ecclesiastical life of the times is also interestingly introduced. We place *A King's Thegn* in the front rank of prize books.

Such a Tomboy, and Other Stories. By Katherine E. Vernham. The title story shows how Grace, the tomboy, by her inconsiderate conduct, causes a severe illness to her twin brother. She is thus led to tame her high spirits and become her mother's "right hand." Of the other stories, "Michael's Moke" is sweetly pathetic. All are written with the object of inculcating the duty of self-denial, and of increasing our regard for the animal creation.

Some Great Thing. By Lady Dunboyne. A capital story for girls, and will make a really admirable gift-book. Helen, the second daughter of Colonel Atherley, is the heroine of a very interesting and well-conceived story. Her father had been wounded in fighting his country's battles, and was a chronic invalid. Helen constituted herself his chief nurse and companion, as she alone of the family really understood his noble and Christian fortitude and patience. Whilst eager to do "some great thing," her father, by his word and example, impressed upon her the beauty of self-denial in the cause of others. And this was further emphasised by her friend Winnie Randolph—a really sweet character—the victim of adversity, borne in a nobly uncomplaining manner. Eventually Helen finds her reward, although after much suffering and anxiety.

Bugle Minor. By M. Bramston. This is a veritable boys' book. Powerfully written, with plenty of adventure realistically described; with a really healthy moral tone throughout; brimful of interest, and incidentally conveying much geographical information, there is not a dull sentence in the book. Sidney Randal, a boy of fourteen, became a drummer-boy in the marines on the death of his father. Sid was a bold, high-spirited, mischievous, but typical British boy. On his first voyage on board the *Firefly*—ordered to the East Coast of Africa to suppress the slave traffic—he was taken captive by an Arab dhow, and shortly became tutor to the sons of a sultan in the interior. Sid's fellow-prisoner was a young Arab who, having accepted Christianity, was sold as a slave. The Christlike fortitude and resignation of Ibrahim exerted a powerful influence for good upon Sid, who was hardly disposed to look upon the Christian life with such sincerity as Ibrahim, who suffers a martyr's death. Sid escapes to Lake Nyanza, where he is rescued by Mr. Archer, a missionary and a former friend. A boy will hardly read this book without feeling a desire to emulate both Sid and Ibrahim.

"THE HEIR OF HASCOMBE HALL." (T. Nelson and Sons.)—*See p. 315.*

The Herd-Boy and his Hermit. By Charlotte

M. Yonge. Another pleasing historical story by Miss Yonge. The period chosen for the romance is that of the Wars of the Roses. Hal, the herd-boy, is the son of Lord Clifford, who met his death on Towton field espousing the cause of Henry the Sixth. The story introduces us to Hal as a herd-boy on a northern moor, where he had been taken for safety. Lord Clifford had killed young Edmund of York, and thus Hal was an object of bitter hatred, and was eagerly sought after by the Yorkists. A young girl, lost on the moor

"TOM GRAHAM, V.C." (T. Nelson and Sons.)

and found by Hal, proves to be the Lady Anne St. John, from Greystone Priory, adherent of the House of York. Hal and the Lady St. John form a friendship which the story unfolds. On the same moors the saint-like Henry of Lancaster was also in hiding, as a hermit—a character peculiarly fitted for his gentle disposition. Hal becomes acquainted with the hermit, who inspires in him a strong regard for his unfortunate king. Hal fights for his king, and is wounded at the battle of Barnet.

Probably the best-drawn character in the book is that of the vigorous, noble-hearted prioress. Although treating of such troublous and warlike times, the story is pervaded by a gentle tone throughout. It forms an admirable gift-book for older boys and girls, and as such we heartily recommend it. There are five full-page illustrations by W. S. Stacey.

T. NELSON AND SONS.

The Heir of Hascombe Hall. By E. Everett-Green. A more than passing value seems to us to belong to such a careful delineation of a past age as this admirable and extremely interesting tale of the days of the early Tudors. Miss Everett-Green has studied social history to some purpose before giving us so vivid a picture of England in the first few years of the sixteenth century, when monastic abuses were beginning to attract general attention. The story contains a well-woven plot of an exciting nature, and its development and the unravelling of its mystery will be followed with unflagging interest by lovers of historical romance. The narrative does not relate to any specific historical events, but rather to a typical family history, into which are woven many striking incidents, and characteristic scenes of citizen life at a stirring time. "Madcap Hal" is effectively introduced into more than one of these scenes. The story is one of a series of Tales of English History, and forms a handsome illustrated volume in a very tasteful binding. It is particularly suitable for elder boys or girls.

Tom Graham, V.C.: A Tale of the Afghan War. By William Johnston. The first scene in this story is a fire at the pit mouth of a Northumbrian coal-mine, as seen from the neighbouring Grammar School. Tom Graham, a day scholar, is son of the manager of the mine, and he arranges to take several boys, contrary to rule of school and pit, to see the underground workings. From this beginning is developed a highly-interesting and well-constructed story, in which we are introduced to miners, fishermen, smugglers, and coastguardsmen on the coast of Northumberland, and then, later, to stirring scenes of war and victory on the Indian frontier and in Afghanistan. The high spirits of Tom led him sometimes into serious scrapes at school; but from the most serious of all sprang a lasting friendship with a schoolfellow, William Jarvis, whom he had almost killed in a fight based on a false suspicion, but who afterwards became a brave officer and a peer of the realm. By its earnest tone, its picturesque writing, and the variety of its incidents, this book establishes a claim to a conspicuous place among the boys' books of the season. The author reproduces the dialect of the northern pitman with capital effect. George Soper and Emily A. Cook supply some excellent illustrations.

Trefoil: The Story of a Girls' Society. By M. P. Macdonald. Three girls, who in spite of very

marked differences of character have been the best of school friends, are about to leave the Australian high school where they have been educated. On the eve of their separation they make vows of lasting friendship, and form a society of their own. Thus they become "Leaves of the Trefoil;" and amongst their vows is one that, at the end of five years, they will meet again to renew or revise their rules. Changes come upon them immediately. Trix Beresford starts with her wealthy father on a voyage round the world; Nelly Lawrence, who has been somewhat of an idler, has to turn to work at home, on account of the complete loss of her mother's means; and Susie Snow follows her bent for study, in order to obtain university honours. In a charming style the author traces the careers of these three girls, telling us how their characters develop, and how their circumstances change, and yet how their vows are kept. They meet before the five years expire, and become near neighbours; but the serious things of life and death make their mark by the time for the renewal of the girlish vows, and one of the three can only in spirit be present at the meeting of the other two. It is a really excellent book for older girls. It is beautifully illustrated by W. H. Margetson.

"TREFOIL." (T. Nelson and Sons.)—*See p. 315.*

Mobsley's Mohicans: A Tale of Two Terms. By Harold Avery. This brightly-written school story professes to record a man's recollections of the events of two terms at Hanover House Academy, a boarding and day school, where, five and twenty years ago, the supposed writer was known as "Young Dean." Many are the scrapes into which the boys' high spirits and ingenious but ill-advised plans lead them, from the opening chapter, in which on a hot summer night they play a cricket match on the top landing, with a portmanteau for wicket, an old umbrella for bat, and a tied-up pair of stockings for ball, till the last chapter, in which their object of forming a cricket club and obtaining a ground is at last attained. The book derives its name from the circumstance that one of the boys, Mobsley, having a copy of *The Last of the Mohicans*, some of the others become infected with an enthusiastic admiration of the adventurous Indians, and form themselves into a band in which are representatives of Deerslayer, Chingachgook, and Uncas. The book contains enough boisterous fun, boyish plotting, school slang, and rough humour to satisfy every lover of this popular type of story. From the first page to the last the interest is well maintained. Seven illustrations by J. H. Bacon add to the attractions of the volume.

The Twin Castaways. By E. Harcourt Burrage. Two boys—mere babes—are thrown up on the beach in a storm, and an old fisherman takes them home and brings them up. After fourteen years a stranger comes, makes some claim upon them, takes them and their foster-father away, and before long they are all three abandoned on the shore of French Guiana. A life of danger and adventure succeeds, and is recorded in this attractive volume in a manner that will surely interest every boy who reads it. We will not tell how all the perils are overpast, but we may say that no reader is likely to be disappointed in the end he will be eager to reach. The cover, the frontispiece, and title-page are artistic and appropriate.

The Fellow who Won: A Tale of School Life. By Andrew Home. This is a smartly-told story of life at Barford Grammar School—the hero, or most prominent good character in the book, being Ned Duncan, adopted son of the master, Dr. Templeton; and the "villain" of the story being a boy named Field, who is an orphan ward of the Doctor's. The various escapades into which these boys and their school-fellows are continually getting are described in a graphic manner, as well as the complications arising from Field's enmity towards Duncan. Dr. Templeton wishes to train up Ned to succeed him as headmaster, but Ned's being something of a dunce is a hindrance to this, and Field wickedly strives to ruin Ned's life. At the very last page of the story, however, we find that, after all, there is an element of good in the villain. The interest is remarkably well sustained. Miss Emily Cooke contributes six capital illustrations.

A Daughter of France: A Story of Acadia. By Eliza F. Pollard. In this story we find a series of vivid descriptions of the exciting life led by the early settlers in the edge of the primeval forest which covered so large a part of the American colonies. The time is when Richelieu ruled in France, and the persecution of the Huguenots was rife, and in the New World rivalry between English and French colonists and refugees allowed but transient intervals of peace. Jacqueline de la Tour is a real heroine, a brave, lovable woman skilfully drawn. The story abounds in thrilling episodes, recorded in a brilliant fashion, which cannot fail to interest and impress the reader. Jacqueline's journey through France from La Rochelle to Paris on behalf of her husband, and her defence of the Fort de la Tour, are wonderfully moving and pathetic. For its graphic description of early colonial scenes, for its well-drawn characters and exciting incidents and development, the story deserves to be read and remembered. This book contains several good illustrations by W. Rainey, R.I.

Phil and I. By Paul Blake. This is a very pretty

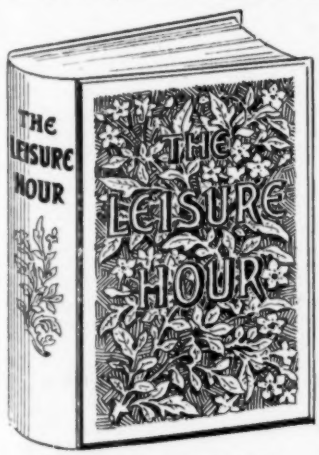
story, illustrative of life in a southern town of England in the latter part of last century and the early years of this. Phil is Count Philippe de Varennes, son of a French nobleman who emigrated rather than submit to the conditions of life under the First Republic. His friend who tells the story is an orphan boy, William Heelis; and the tale includes an account of the education and friendship of the two boys, and the adventures into which the relations of the two neighbouring countries brought them. Some of these adventures are very exciting, and the pictures of school life, of an old-fashioned fair, and of prison life are vivid and entertaining. The nature of the book is well indicated in the illustrations which form the frontispiece and vignette.

THE RELIGIOUS TRACT SOCIETY.

The Girl's Own Annual (1899). This volume well sustains the reputation so long enjoyed by *The Girl's Own Paper*. No girl, we think, can fail to appreciate the mass of instructive and most entertaining information here provided. The editor evidently has before him the important fact that an all-round kind of paper is best for his clients, and we agree with him, and so does an experienced lady friend of ours, who says she thinks it would be impossible to find for an elder girl a better Christmas gift book than this.

Of the illustrations we cannot speak too highly, and "The Portrait Gallery" is a unique feature, being presented to the reader with the thousandth number of the paper. Of course, it is a sheet of portraits of scores of contributors; and besides its making the readers feel more at home with the writers, it is a capital display for the learned in physiognomy and phrenology to pore over.

Leisure Hour (1898-99). This new annual volume is excellent in every way, and we heartily wish that thousands of our young people would give up the disconnected, memory-spoiling pennyworths so much indulged in at present and "take in" this brightly-written, up-to-date, and most suitable magazine. It seems, in its present form, all that can be wished; but we are informed that an entirely new series begins with November, and that Sir Walter Besant will contribute to it the leading serial. The volume before us contains four serial tales, and each is capital reading. The papers on popular science and discovery treat of most interesting topics. The short stories and sketches will please all readers; indeed, instruction and education go hand in hand all through the book, but so attractively that one is led on and on, unconscious of the passing hour.



THE RELIGIOUS TRACT SOCIETY.

We are quite sure that our elder boys and girls, and especially our scholars in the evening continuation schools, need only to have this high-toned periodical brought before their notice to secure them as subscribers. For our own part, we mean to make a special visit to the particular evening school known best to us, and for the young people's sake bring *The Leisure Hour* before them. If it were the only magazine read by them during a year, and read with attention, they would be so far well-educated people.

All the illustrations are excellent; and the photo reproductions of some of our best-known pictures, by Greuze, Leader, Orchardson, Millais, and others, are specially good to look at. "The Huguenot," "The Silent Evening Hour," and "Her Mother's Voice" are of the number.

The Sunday at Home (1898-99). Can anything that is not good come from 56 Paternoster Row? Judging from this and other volumes which we have the pleasure of reviewing this year, we can say without hesitation that no house caters for the young better than this. We sincerely wish that into every English home one of their serial publications will find its way. With the high tone that pervades them all, *The Sunday at Home* is specialised for family reading on the day of rest. Young and old, and those in between, can all find here what they wish to see; for there are serial tales by Eglanton Thorne and Emily P. Weaver, and many short and well-illustrated stories, besides a good store of more solid matter.

All the illustrations are good, but the photos of well-known pictures and the coloured prints are quite beautiful. Altogether the book makes a valuable gift.

SAMPSON, LOW, AND CO.

Captain Mahan's Life of Nelson. New revised and cheap edition. A biography of our great national hero, written by an officer of the United States Navy. What could be more suggestive and opportune at this time of wars and rumours of wars, in this hour when Cousin John and Cousin Jonathan join hands so heartily? Teacher and pupil alike, we are all of us more or less familiar with the outlines of Nelson's noble life; but in the magnificent book now before us we have a detailed biography, which enables us to follow the hero through his innumerable adventures, voyages, battles, from his boyhood in the quiet Norfolkshire rectory to the sad but glorious day of Trafalgar. By means of anecdotes, portraits, extracts from letters, minutiæ of private life, we can imagine ourselves in close personal intimacy with the great admiral; with the aid of the numerous maps and battle plans, we can in fancy fight over again those glorious struggles which saved us from a national downfall. Captain Mahan, who evidently worships his hero as fervently as any Englishman could do, sees in Nelson the embodiment of the sea power of Great Britain. Nelson is that, and more. He is the personification of those national qualities to which the British Empire owes its rise, the embodiment of that stern strength which knits the vast fabric together as with girders of steel. It is the fashion with some to decry the empire, as the outcome of grabbing greed and deliberate conspiracy against the rights of the rest of humanity; whereas it ought rather to be regarded as the natural result of the unconscious, ever-developing individuality, the restless enterprise, the persistent energy, the masterful instinct for rule and organisation which are characteristic of our race. At this moment, when we are eagerly watching the changes and chances of the struggle in which our nation is engaged, when we hear rumours of foreign intrigue, when we note how heartily we are hated, how the foreign press boils over, like a witch's cauldron, with envy, hatred, and malice, when American sympathy and Colonial loyalty make thinking people place in the solidarity and strength of the Anglo-Saxon race their sublimest hopes for the future peace and prosperity of the world—it is good to turn to Nelson, to trace his character, note how he won

his battles, draw inspiration from the study of the indomitable energy and spirit with which he and our brave fathers faced a hostile world.

The work would make an admirable prize—full of historical and geographical information. Printing, binding, and illustrations leave nothing to be desired. It is a volume that should find a place in every library in the kingdom.

WARD, LOCK, AND CO.

A Man's Foes. By E. H. Strain. As a gift-book for children in the upper forms and for adults, *A Man's Foes* will stand in the very front rank, not only for this season, but as an enduring historical novel. The story treats of the stand made by the Protestants of the north of Ireland against the introduction of the Romish practices of James the Second.

Naturally, the greater part of the book is taken up with an account of the memorable siege of Londonderry; but the story which is interwoven is so strong, yet in part so simply pathetic, that one cannot read it without feeling, not only the better for the perusal, but that Londonderry occupies a noble pinnacle in the history of British Protestantism. E. H. Strain has given us episodes and types of character so vivid and so life-like that we seem to live with the story; and a better testimony to the worth of the book we could not give. The strong, self-denying, puritanical spirit of the Nonconformist minister of the period is admirably given in the character of Mr. Hewson; whilst the sailor captain—Mr. Browning—displays the tender and nobly chivalric disposition of a Christian hero. ("O sancta simplicitas!") Margery, as a faithful servant, and Gorman, the witty and wild yet faithful Irish boy, are typical characters, and, with the old Scottish gardener, fill important niches in the story. Space forbids us saying more; but *A Man's Foes* should be found in every library.

The Old Helmet. By E. Wethcrell. This is a very acceptable edition of a very popular girls' book. It is unnecessary to speak of the tale; let it suffice to say that *The Old Helmet* runs *The Wide, Wide World* very close in popular favour. This edition is attractively bound, and has two pretty illustrations.

Cressy and Poictiers. By J. G. Edgar. Mr. Edgar has dealt very exhaustively and in a fascinating manner with one of the most glorious epochs of English history. The story centres itself in the lad Arthur Winram, who becomes a page to the Black Prince.

The style is attractive, and the book is written in such a way as to give the reader a good impression of the manners and customs of the times.

Danesbury House. By Mrs. Henry Wood. New edition. This good old tale still goes on successfully fulfilling its useful purpose—that of trying to drive out the drink-fiend from amongst us. Isabella Danesbury is still a girls' heroine, and her marriage with Lord Temple has lost none of its interest for a certain class of readers, among whom we may mention the girls of the upper classes in day and Sunday schools, and the scholars of evening schools. It appeals more to girls than to boys, because of the many broken hearts and broken homes of which it tells. The old-fashioned references to stage-coaches, which were in vogue in the early days of the temperance movement, do not, we find, detract from the attractiveness of the book at all with the present generation. The "Star of Hope" public-house, in which only non-intoxicants were sold, and where pleasant society and good books could be found, has not had imitators enough since Mrs. Wood made the suggestion, for few realise as strongly as she that gin-shops are so successful because they recognise the fact that man is, as Dr. Johnson said, "a clubbable animal," whether he be a dram-drinker or an abstainer.

Mrs. Henry Wood did excellent yeoman service when teetotallers were a new species of English people, and her good work is still required. Whilst this book retains its place as a favourite, the writer is still at her post, and therefore a new edition is very welcome.

Poems of the Love and Pride of England. Edited by F. V. M. Wedmore. Mr. Wedmore and his daughter have accomplished a praiseworthy work in making this admirable collection of patriotic poems. It was their object to produce a hymn-book of imperial-

"A MAN'S FOES." (Ward, Lock, and Co.)

ism. How much need for such there is, Mr. Wedmore shows in his preface: "In a time when selections and collections were in vogue everywhere, and the anthology was in every household and perhaps in every school, no serious effort had been made to cull from the poetic achievements of the past and present that which should be fairly representative of all the various moods and methods of patriotic verse....."

They have achieved much success; indeed, it would be difficult to improve upon the collection if only Tennyson's poems had been available. The get-up of the book is choice in the extreme.

Two Years Ago. By Charles Kingsley. This is a cheap and at the same time desirable edition of an old favourite. The publishers have done their work well. The edition should be in great request.

F. WARNE AND CO.

The Poetical Works of Alfred Lord Tennyson, Poet-Laureate. This is an entirely new and complete edition of the poems, well printed, with beautiful frontispiece of author, and exquisitely bound in pale green cloth of the appearance of watered silk, and with a tasteful design in gold and white, with gilt edges. A prettier and more carefully prepared volume of Tennyson we have never seen. Our readers will do well to order Messrs. Warne's new Albion edition of our great poet's works, which cannot fail to prove one of the most acceptable gift books of the season.

Stories from Shakespeare. Written and illustrated by M. Surtees Townesend. This handsome volume at once provokes comparison with the well-known *Lamb's Tales*, so it may be well to state first that it contains eight of the twenty plays rendered by Charles Lamb, and in addition versions of *Madcap Harry* and of *Henry V.* *Miranda*, *Puck*, *Antonio*, *Rosalind*, *Perdita*, *Imogen*, *Macbeth*, and *Hamlet* are the titles of the rest. The stories of these are given more fully than by Lamb, and at the same time certain crudities have been avoided. Here and there, perhaps, the descriptive filling-in is a little overdone—for example, Miranda is "rubbing her eyes and trying hard to keep awake"—but on the whole the stories read exceedingly well, and should prove very useful, not only to those who have not begun to read Shakespeare for themselves, but to others who desire to get a clear grasp of the stories of the plays. The humorous scenes are well given, and the poetry has not disappeared. The songs are mostly given intact. The illustrations are admirable and abundant. The whole book is a labour of love, and one can only congratulate the author on her intimate acquaintance with Shakespeare, and on the tact and grace with which she has become his interpreter.

"STORIES FROM SHAKESPEARE." (F. Warne and Co.)

In the Shadow of the Hills. By Alison McLean. This is a book beautiful in its descriptions of country scenes, and in its appreciation of fine character in lowly life. It contains five short stories strung together slightly by locality. The preparations of the old ladies at the post-office to entertain their cousin's son are amusing; and the restoration of Meg to happiness, after years of conviction that "there's nothin' in this world to be cheerful about," is touchingly told. A deep, refined religious tone runs through the stories, and they will perhaps attract the adult rather than the young girl.

From the Neuchâtel *Comptoir de Phototypie* we have received a few samples of a series of **Pictorial Postcards.** They illustrate Alpine scenery, and some of the chief towns in Switzerland. These photographic reproductions are charmingly printed in delicate colours. Many of our readers, we feel sure, will be glad to avail themselves of these pretty and cheap (1d.) cards for circulation among their friends at Christmas and the New Year. Application should be made to 57 Chadwick Road, Peckham, S.E.

T. NELSON AND SONS.

PICTURE BOOKS FOR THE LITTLE ONES.

THE pictures in the Christmas books this year are extraordinarily good, and one wishes to be a child again to enjoy them completely.

Soldiers of the Queen. This is a book of astonishing value. The illustrations give every detail of a British soldier's life in peace and war. Pictures of barrack and camp life, transport ships, military cyclists, war balloons, sappers and miners, elephant batteries, etc., are full of minute detail.

Sir Redvers Buller winning his Victoria Cross and the Queen presenting the Victoria Cross are pictures which appeal to all boys from five to fifteen. It is an excellent book that ought to be given to every child.

Happy Days in the Country. This is an ideal picture book. The lambs, pigs, ducks, rabbits, horses, etc., are so natural that you almost expect them to walk out of the pages.

Bible Alphabet. This is a very attractive book, and some of the pictures are really artistic. "Christ Blessing Little Children," "Abraham and the Angels," and "Moses Receiving the Tables of the Law," are very striking.

The Sweet Story of Old. The story is very simply told, and the book is profusely illustrated. Those of us who remember our delight in the old-fashioned *Peep of Day* will be anxious to give children this volume. Some of the pictures are outlines, and will lend themselves to the joy of colouring.

RAPHAEL TUCK AND SONS.

Children's Treasury. This volume is full of good things for the nursery and schoolroom. The four puppies full of mischief form the frontispiece.

Our Darlings. This is an excellent picture book. "Jack and Jill" and Kitty on the draught-board are particularly fascinating.

Our Pets and **Farmyard A B C.** This book is full of dainty kittens, cunning puppies, yellow ducklings, bunnies, lambs, and children.

A HAPPY CHRISTMAS AND A GOLDEN 1900.

THERE is no class of production that finds more favour at this season of the year than the **Christmas** and **New-Year's** cards, calendars, toy-books, booklets, and art novelties issued by Messrs. Raphael Tuck and Sons, the famous house in the art publishing world. For many years we have annually drawn attention to their specialities in terms of praise sufficient to convince our readers of the premier position occupied by the firm in all that concerns art productions of the kind now referred to. To-day Messrs. Tuck's samples show that their enterprise and resource are limitless. Year by year they improve upon the choice, and upon what appear to be perfect works of art; and it would seem impossible to manufacture productions of higher merit than those submitted for **Christmas 1899** and the **Golden 1900.**

Messrs. Tuck state that at no period has their quest into novelty departure been more successful than in the twelve hundred entirely new sets of cards now introduced. Of these, the most important, and embodying no less than a fourth of the entire collection, are the "Mediæval," the "Early English," the "Modern Art," and the "New Century" series, in which simplicity of design and effective appropriateness of lettering form the leading special features. Next in importance comes the "Wedgwood" series, and here Messrs. Tuck's exclusive arrangements with the world-famed firm of Josiah Wedgwood and Sons, by which the whole of their unique designs by eminent artists of this and other decades are placed at their sole disposal for greeting-card purposes, has stood them in good stead. In rapid succession regarding their order of merit follow the "Painted Parchment" and the "Vellum" leaflets; the "Florentine," the "Mosaic," the "Realistic Flower," and the "Silver Fern" series; the "Old Century," the "Vandyke," and the "Golden Century" folders and leaflets; the "Nowel" and the "Goodwill" series, respectively representing their chaste collection of religious cards; while an important line of humorous cards will be found represented in the "Jester," the "Merry Season," the "Pierrot," and the "Merry Sport" folders. Add to these the remarkable collection of upwards of three hundred sets of black-and-white cards, in which the choicest of designs have been reproduced by the most modern and artistic methods, and headed by entirely new representations of their famous "Platino Panels," and a collection of cards is arrived at which may fairly claim to be unprecedented. Special sets of cards arranged in casket-shaped boxes, and large calendars in great variety, are numbered among the firm's output of specialities for the season.

Among the juvenile toy and gift books may be mentioned *Father Tuck's Annual for 1900.* This annual is exceptionally well printed; and the illustrations are veritable specimens of lithographic art of exceptional beauty and worth. All cards and specialities, whether in colour, tone, tint, or black and white, are undoubtedly masterpieces of original work by the highest talent, and are produced in endless variety of artistic shape and design.

We again with pleasure recommend our readers, before making their purchases, to specially examine Messrs. Tuck's productions.

[Owing to the large number of books received, we shall publish in our next issue a further instalment of Illustrated Gift-Book notices.]

OUR CERTIFICATE COURSE FOR 1900.

BY GEORGE COLLAR, B.A., B.SC.,

Head-Master of the Stockwell Pupil Teachers' School.

TEST QUESTIONS ON LAST MONTH'S WORK.

Theory of Teaching.

First Year.—1. Sketch the steps you would take in teaching division of decimals, showing particularly how your teaching is based upon previous rules.

2. Define "subject" and "predicate;" show that these two include the whole sentence, and that consequently the "object" is a part of the predicate.

Second Year.—1. Mention "aids to memory" that you consider legitimate, and any that you would condemn.

2. Give a sketch of Plato's allegory of "Mother Country."

English.

First Year.—1. Explain the phrases "subtle schoolmen;" "Self-love, the spring of motion, acts the soul;" "Aaron's serpent;" and "upon the peccant part."

2. What is the difference between a metaphor and a simile? Give illustrations from the *Essay on Man*.

Second Year.—Give a sketch of the essay on "The Sight of Shops."

History.

Both Years.—1. Give an account of Walpole's Excise Bill; show whether it was based on sound principles, and say why it was withdrawn.

2. Give a connected account of the relations between England and Scotland under George the Second.

Euclid.

Men—First Year.—1. ABCDEF is an irregular hexagon. Show that if the angles at A, C, and E are together equal to those at B, D, and F, the circumference of a circle may be drawn passing through all the angular points of the figure.

2. Through any point, O, in a circle two chords, AB and CD, are drawn at right angles to each other; prove that the chords AC and BD are together equal to the chords AD and BC.

Men—Second Year.—1. Show that the regular hexagon inscribed in a circle is three-fourths of the regular hexagon described about it.

2. Describe a triangle, having given the three angles and the radius of the inscribed circle.

French.

First Year.—1. Give the present and future indicative tenses of *voir*, *pouvoir*, and *pourvoir*.

2. Translate into French:—(1.) I resolved to start walking again without losing an instant. (2.) I envied the perfect indifference of Hans, who, without seeking for causes and effects, went on blindly where fate led him. (3.) Without stopping to seek for new arguments, I contented myself with accepting the situation such as it was.

Second Year.—1. What is the difference between "*Nous nous sommes* **proposé**....." and "*Nous nous sommes* **proposés**....."? Complete the sentences.

2. Account for the agreement (or not) of the past participles in the following sentences:—*Ma sœur s'est* **servie** *la première. Ma sœur s'est* **servi** *du café. Les fantassins se sont* **laissé** *surprendre. Les cavaliers se sont* **laissés** *tuer. Je ne compte pas les heures que j'ai* **dormi**.

SYLLABUS AND NOTES FOR DECEMBER.

English Composition.

Prepare essays on:—

1. Proverbs.
2. Manners make a man.
3. Gambling.

Theory of Teaching.

First Year.—Notes of lessons. Consider these from two points of view—(*a*) as a private guide to the teacher; (*b*) as an examination test to show how a particular subject would be treated. The notes drawn up in both cases will have many points in common, but in the second it is necessary to insert "Class" or "Age of Children," "Time," and many points which a teacher need not put down every time he draws up a sketch for his own private use.

Be careful to avoid vague generalities. For example, if you state the "aim of the lesson," be sure that you set down the specific aim of the particular lesson; do not say it is "to cultivate the children's intelligence," or any of those aims which are common to all lessons.

The notes for most lessons can best be arranged in two columns, "Matter" and "Method;" in the former should appear a statement of the facts to be learned, and in the latter an indication of the way in which those facts are to be communicated. A very common fault is to turn the "Method" column into a sort of catechism, but the actual questions to be asked should not be inserted in the notes; still less should the answers which are expected from the children be found there. The "Introduction" should not be an invitation to the children to guess what the lesson is going to be about, but should indicate what the children are expected to know, which will be of immediate use to them in grasping the lesson. The proportion between "matter" and "method" is subject to wide variations: in a history lesson, for example, the bulk must consist of "matter;" but in an object lesson the greater part will frequently consist of "method."

Logic.—Logical method (see Jevons, chap. xiii.). Pay careful attention to the revolution brought about by Descartes in philosophy. Before his time, knowledge was based upon authority; it was sufficient for a master to make a statement—whence the phrase *ipse dixit*—and the pupils to believe it. Descartes taught that it was not sufficient to *believe*—it was necessary to *think;* and he drew up a few simple rules which would enable a person to deal with the difficulties which arise in the search after knowledge. Study also the next chapter, on "The Laws of Thought," which will lay a foundation for the important chapter on the syllogism, which we shall take next month.

Second Year.—Imagination: its relation to memory; points in which it differs from memory. Means of setting the imagination to work—that is, "trying to picture to oneself." Child imagines what an iceberg is like by *magnifying* the image of a piece of floating ice which he recalls to his mind. We imagine what a mermaid might be like by *combining* one half of the recalled image of a woman with half of the recalled image of a fish. We conceive of a fairy by *diminishing* our concept of a human being, adding the qualities of rapidity, etc. Closely allied is the process of *idealisation*, which consists in the extension of our notion of a thing to such a degree that the thing can have no concrete existence: we might take as examples the conception of a mathematical point, line, or plane. Vivid imagination in children, shown by their use of sticks for dolls, and dolls for live babies (see the admirable chapter on "The Young Pretender" in Professor Sully's *Studies of Childhood*). The teacher's work of developing the imagination on right lines and preventing it from running wild.

Plato's "Republic," Book IV. Although community of goods may not be most beneficial to the "guardians," yet the statesman's object should not be to secure the private advantages of any one class, but to arrange all harmoniously together for the best welfare of the state as a whole. A state is strong which holds the balance between other states or confederations. A city should so moderate in extent that absolute unity should prevail; there should be no caste, but promotion or degradation should follow merit or unworthiness. Education is such an important matter because it enables people to deal with other matters; and the benefits derived through education are transmitted to children and posterity in ever-increasing degrees. Any alteration in the musical or gymnastic training endangers the constitution of the state. The state should control the education of children from their first infancy; thus they learn respect for their elders, etc.—points which must be taught by example, not by law. Penal laws indicate an unhealthy condition in the state. Religious institutions should be founded by law.

The inquiry after justice begins with the assumption that the ideal state founded is perfectly good, and that goodness consists of four things, which we call the four cardinal virtues—Prudence (or Wisdom), Temperance, Fortitude, and Justice.

These are truly important, but it is wrong to assume that all goodness must come under one of these headings; hence the search for justice by the "exhaustive method," or "method of elimination," is not logical.

Wisdom in the chapter means essentially the knowledge of social economy possessed by the "guardians." Fortitude is that virtue instilled into the soldiers by means of education, just as a dye colours a cloth. Notice the explanation given of the ex-

pression "master of oneself." So temperance in a state implies the government of the worse portion by those who are better, both from natural endowments and from education—the governed willingly accepting the control of their governors. It differs from prudence and fortitude in requiring this harmony between the classes. The idea of justice is now nearer to us than we imagine. Justice is the necessary condition under which we have founded the state. It consists, first of all, in each one doing his own business, and refraining from all officious interference with others. It is difficult to give precedence to any one of these four virtues.

Arithmetic.

Averages. There should be no difficulty in grasping the fundamental principle—namely, that the sum of the terms is equal to the average multiplied by the number of terms; but practice is necessary in order to apply it to some of the more difficult problems. Study proportional division, including partnership, partnership with time, and other matters which the older arithmetics treated as separate rules. Questions of this class are not difficult when the student realises the importance of reducing the various terms to a common standard: for example, capitals put out for various lengths of time should be replaced by capitals invested for one unit of time—£500 for 3 months = £1,500 for 1 month. Confusion sometimes arises when students are required to divide a sum of money in the proportion of two or more fractions. But notice—"Divide £35 in the proportion of $\frac{1}{3} : \frac{1}{4}$" does not mean, "Find $\frac{1}{3}$ and $\frac{1}{4}$ of £35." But $\frac{1}{3} : \frac{1}{4}$ as $\frac{4}{12} : \frac{3}{12}$, and fractions with the same denominator, are to one another as their numerators; hence we must divide £35 in the proportion 3 : 4—that is, one part will be $\frac{3}{3+4}$ of £35, and the other $\frac{4}{3+4}$ of £35.

This month's work in arithmetic should also include practice in examples which depend on common-sense and combination of very elementary principles rather than on difficult rules. Study chapter xxviii. in Christian and Collar's *Arithmetic*, and work as many of the examples as possible.

English.

First Year.—The inflections of the noun and adjective, including their historical development.

Essay on Man, Epistle II., lines 175–294.

177. *The Mercury of Man is fixed.* Bodies which pass away in the form of vapour when heated are called "volatile;" those that do not are "fixed." Mercury is volatile; but on the supposition of the old alchemists, that the only elements are earth, air, fire, and water, it was thought possible to convert mercury into a "fixed" metal by making it combine with more earth (dross), or by extracting some of its water or of its air. The six lines, however, contain a shocking mixture of metaphors. First, "our best principle" is a twig grafted on to the stock of "this passion;" now it is a volatile element "fixed" by combination; again Pope reverts to horticulture, and describes the growth of his "graft" nourished or "mixed" with the sap of nature; then again to alchemy—the "too refined" virtue being held in fixed or solid form by the "dross" of passion; this last, in its turn, is drawn from another metaphor, for the chemical "fixing" is likened to the joining of stones together to make a wall; finally, all these figures, or at least the chemical ones, are thrown away, as they do not illustrate the co-operation of mind and body due to a common interest.

181–182. Paraphrase thus: "As some kinds of trees which are shy in bearing fruit when planted and growing on their own roots, bear readily when grafted on to a wild stock"..... An apple-tree grown from a pip will not bear fruit under eight or ten years, and then it may be so "ungrateful to the planter's care" as to produce a very inferior sort of apple, quite unlike the one from which the pip was taken; whereas a twig of the tree grafted on to a crab-tree (or wild apple-tree) stock will bear in two or three years.

181–194. Pope omits to state that the difference between the good and evil passions lies in the motive which puts them into play, and in the restraint imposed on, or licence given to, feelings which may, it is true, have something in common.

198. *Nero.* A Roman emperor (A.D. 54–68), noted for his cruelty. Titus, a Roman emperor, whose short reign (A.D. 79–81) was marked by wisdom and beneficence.

199. *Catiline.* A dissolute Roman who plotted against the state, B.C. 62. Decius, a Roman general who fought against the Latins, and sacrificed himself to secure victory for his country, in fulfilment of a prophecy which said that the country whose general was killed would be victorious. Curtius, a noble Roman, who sprang into a chasm to render the gods propitious to his country.

217–220. These fine lines contain a deep truth.

225. *Owns it.* The antecedent of "it" is by no means clear.

The simile between the "extreme of vice" and "the north" is clearly drawn up to this point; in the lines which follow there is confusion.

232. *In the degree* = in some degree.

234. Supply "are." We cannot carry forward "is" from 233.

257–260. The meaning is, that as love springs from a sense of the need of help from others in bearing our infirmities, so the feeling that we shall soon be where pain is no more makes us the more readily relinquish our earthly ties.

262. This statement is by no means universally true.

269. *Chemist*—that is, alchemist, who was consuming his substance in the shadowy search for gold.

279. *Scarfs, garters, gold* = honours and riches.

280. *Beads.* The parts of a rosary, or little balls used in counting prayers. A.S. *bēd*, a prayer.

285. *Want.....supplied.* Nominative Absolute.

283 to end. Notice the tremendous piling up of metaphors at the close of this Epistle.

Now thoroughly revise the whole of the Second Epistle.

Second Year.—Read carefully the next ten Essays of Leigh Hunt, and make short sketches or analyses of them.

Read the summaries or "arguments" at the head of all twelve books of *Paradise Lost*, so as to obtain an idea of the work as a whole, and of the relations between the books; then carefully read through Book I.

Geography.

Both Years.—In studying the geography of the individual countries in Europe, it is convenient to group them according to position.

South-West Europe, consisting of Spain, Portugal, and France.

Spain and Portugal, or the Iberian Peninsula.

The "build" is somewhat simple. Much of the interior is a table-land bounded and crossed by mountain ranges.

The mountains of Castile and Toledo cross the table-land and separate the river basins. The Sierra Nevada, near the Mediterranean shore, is not connected with the table-land.

The rivers of the Peninsula, though of considerable length, add little to the means of communication.

1. They are, for the most part, too much obstructed by shallows and rapids to be navigable for any great distance.

2. They lie in deep valleys far below the level of the table-land, and therefore cannot be at all easily connected by canals.

3. They have a small volume of water for a great part of the year.

Study the chief rivers, noting that the Guadalquivir is the most important for navigation.

The climate, like the physical features, is somewhat unfavourable to density of population.

The temperature is high; total rainfall of year is less than twenty inches in most parts, though western and northern coasts have a higher rainfall. Rain falls in autumn or winter, summer being a time of extreme drought. Note the one great advantage of the climate—namely, that the long period of high temperature allows of crops being grown in quick succession, wherever water can be obtained for irrigation.

Study chief productions, noting especially the great mineral wealth of the country.

Spain, in spite of a good geographical position, great mineral wealth, and valuable agricultural products, is not an industrial or commercial country. Note some of the reasons for this, such as the expulsion of skilful Arab workmen, the wholesale emigration to South America, wars and revolutions, difficulties of transit in the country.

Note that after the Mussulman rule ended in Spain, and Castile and Aragon were united by the marriage of Ferdinand and Isabella, and Navarre south of the Pyrenees was conquered, Portugal was the only separate kingdom in the Peninsula, which then came to be regarded as consisting of Spain and Portugal. In 1581 Portugal was united with Aragon and Castile; then it regained its independence, and became what it has remained—a separate kingdom.

The Peninsula has not seen any strictly geographical change since the Peace of Pyrenees (1659).

The boundary between France and Spain is formed by the Pyrenees, except in so far as the line may be said to be broken by the French right of patronage over Andorra.

France. In studying the eastern boundary, note great changes, such as:—

1. The practical annexation of the Three Bishoprics—Metz, Toul, Verdun (1552).

2. The legal cession of the Three Bishoprics, and acquisition of Alsatian dominions (1648).

3. Advance into German lands as far as the Rhine, and across the river to Breisach.

4. Advance into Spanish lands until no Spanish dominions stretched north of Pyrenees, Rousillon becoming French (1659).

5. Advance into Flanders, Hainault, and Luxemburg, on the north-east border.

Consider position of country for trade: a great sea-borne foreign trade with north-west, west, and south coasts, and a great international trade with countries on the land border.

In studying the "build" of the country, note mountains in east and on borders, table-land (Auvergne) in centre, plain in west (Landes, valley of Loire) and part of north (valley of Seine).

The *rivers* are most important as a means of internal communication; the canal connections are important. Note (1) connections of Seine and Loire with Rhine, and consider the traffic between France and the Rhenish provinces; (2) connections of Rhone with Rhine and Garonne.

As regards *climate*, France has all the advantages of a westerly maritime situation, together with a more southerly latitude than that of England; hence abundance and value of agricultural products. The south is warmer than England, while the highlands on the north-east have greater extremes of heat and cold.

In studying the productions, note:—

1. The vine zone, east and north of the Landes: vine, flax, hemp, and poppy are grown; the red and white wines of Burgundy, Bordeaux (claret), and Champagne are famous.

2. The zone of pastures, Brittany—famed for butter, cheese, eggs, and honey, as well as for cattle and sheep.

3. The zone of grains and fruits, where grains, beet, and orchard fruits are produced.

Consider occupations of people—agriculture, manufactures, and trade.

Note, when studying the seats of manufacture, that in France each port receives all kinds of raw material, and then distributes, by road or by water, to the nearest fields; follow on map the direction of distribution from ports like Dunkirk, Havre, and Marseilles.

Study the geography of the chief towns and ports in Iberian Peninsula and France, and also the government of each country.

History.

Both Years.—We intended to give the chief points in Walpole's life and political work this month, but the matter is so extremely important that our readers should obtain it first-hand from Mr. John Morley's account of "Walpole" in the *Twelve English Statesmen* series (Macmillan).

Foreign affairs (excluding events in India). Walpole prevented England from taking part in the War of the Polish Succession (1733-35). On the death of Augustus the Second, the nobles of Poland chose Stanislaus Leszczynski, father-in-law of Louis the Fifteenth, for king; while a minority preferred Augustus the Third, the son of the late king, and this party was supported by Russia and Austria. This war effected an alliance between France and Spain, and estranged France from England.

In 1739, in spite of Walpole's efforts, war broke out between this country and Spain, the immediate cause of which was the attempt made by British smugglers to take contraband goods into the Spanish possessions in America. Note Anson's voyage round the world, and attack on Spanish possessions in Peru; also Admiral Vernon's success at Porto Bello, and failure at Cartagena and Santiago.

War of the Austrian Succession: this is generally treated at full length in the history books. The student should read Macaulay's Essay on Frederick the Great, and notice the immense advance made by Prussia by the end of this war. Remember the terms of the treaty of Aix-la-Chapelle: Frederick retained Silesia, but, speaking generally, all places taken by the powers were restored. The British naval power was relatively greatly increased.

Conflict with France in America. French possessed mouth of St. Lawrence and mouth of the Mississippi, the British possessions lying on the shores between. The French endeavoured to prevent the British from spreading into the hinterland by uniting their two possessions by a chain of forts. To stop this, General Braddock made an unsuccessful attempt to reduce Fort Duquesne. French ships captured. Loss of Minorca; trial of Admiral Byng. Opening of the Seven Years' War. British reverses at Cape Breton and at Hastenbeck, after which the Duke of Cumberland had to sign the "Convention of Closterseven," which Pitt repudiated before it was made binding. Pitt forms an alliance with Frederick, and sends him men and money. French defeated at Rossbach and Crefeld; and in 1760, after a hard fight on both sides at Quebec, Canada passed into our hands.

Algebra.

Women—Both Years.—Highest common factors. If possible, factorise all the given expressions, and take out the common factors. It is best to begin by factorising the smallest or simplest expression, then try which of these factors is contained in the more difficult expression. Study the theory, and the method of finding H.C.F. based upon it; but always keep an eye open for factors, remembering that if you detect a factor in one expression, you can try whether it is found in the other: if so, it is part of the H.C.F.; if not, it cannot be a part of the H.C.F., but the working will be greatly reduced by eliminating it.

Men—First Year.—Quadratic equations with one unknown. Pay special attention to the theory. Reduce your equation to the form $ax^2 + bx + c = 0$. Factorise it, if you can, thus—

$$x^2 - 7x + 12 = 0.$$
$$\therefore (x - 4)(x - 3) = 0.$$

Divide both sides by each of these factors in turn, when the quotients will give two simple equations, $x - 3 = 0$ and $x - 4 = 0$, whence $x = 3$ or 4.

Solve a number of equations by the method of completing the square, in order to thoroughly understand the way of obtaining the formula, which should be used to solve all equations of which the factors are not readily detected.

Men—Second Year.—Carefully study the chapter on quadratic expressions and equations, and master the devices applicable to particular types of quadratic equations. Work plenty of examples.

Euclid.

Women—First Year.—To end of 42. Notice that Prop. 35 is the foundation of the group. Observe that there are really three cases to prove in I. 35, but the last two are taken together by adding the common piece of the line opposite the base in one case and subtracting it in the other. In 36, be sure you prove that the figure formed by the construction is a parallelogram.

Second Year.—Propositions II. 5, 6. Be careful to distinguish one from the other. Give the results algebraically, and work exercises on Book I.

Men—First Year.—To end of Book III., with exercises.

Men—Second Year.—Revise Book IV. to end of Prop. 9; work the riders given in the book, and send up any that present difficulty.

Latin.

First Year.—Practise translation and retranslation from the author, and work through the composition, etc., in The Practical Teacher Matriculation Course.

Second Year.—Syntax of the finite verb, with especial reference to sequence of tenses.

French.

First Year.—Irregular verbs of the fourth conjugation. *Voyage autour de ma Chambre*, chaps. xxix.-xxxvi.

Second Year.—*Le Roi des Montagnes* to end of chap. iv., with Exercises 9 and 10 (Practical Teacher edition. Price 2s.).

A New Road-Pavement.—The Germans have recently invented a new system of road-paving. Coal-tar is mixed with sulphur, and thoroughly warmed, and chlorate of lime is added to the resulting semi-liquid mass. When it is cooled, the mass is broken into small pieces, and mixed with glass or with blast-furnace glass slag. The powder resulting is subjected to a pressure of two hundred atmospheres, and reduced to the form wanted. In use, the resistance to wear and tear is fully half as great as that of Swedish granite. The chief advantages of this pavement are durability equal to that of many stone roads, resistance to changes of temperature, roughness of surface which gives horses a good foothold, and the non-transmission of sound. It is also very clean, for the joinings are very small, and it is easy to wash.

Next Month:

WHERE PHYSIOGRAPHY WAS MADE:

Our Visit to Sir Norman Lockyer's Solar Physics Laboratory and Observatory.

Illustrated.

LONDON MATRICULATION.

JUNE 1900.

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LATIN COURSE FOR DECEMBER.

1. Cæsar, Book IV. ch. xxxviii. to Book V. ch. vii.

2. Grammar.—The regular conjugations, and the formation of the tenses; deponent verbs; semi-deponent and quasi-passive verbs; verbs in *-io* of the third conjugation; formation of inceptive, desiderative, frequentative, and diminutive verbs. In the syntax, read the genitive and ablative cases.

3. *Anglice Reddenda*, Nos. 30–40.

4. Sentences from Bradley's *Arnold* or Bayfield's or Allen's *Exercise Book*.

Notes on Grammar.

The four regular conjugations of verbs should be carefully gone through, and the resemblances which they bear to one another should be noted. The resemblances are well brought out in the comparative table of endings in the grammar. Note that deponent verbs are verbs that are passive in form and active in meaning, and are so called because they have laid down (*depono*) the passive meaning. They are the only verbs that have a perfect active participle; some deponent verbs, however, have a perfect participle with a passive signification.

Note the verbs in *-io* of the third conjugation that drop the *i* before *i*, *e* final, or short *er*, like *capio*, *facio*, etc. Semi-deponent verbs are passive in form in the perfect tenses. Quasi-passive verbs are verbs that are active in form and passive in meaning—for example, *vēneo*, *fio*.

The translation of the present subjunctive by "may" is only correct (1) in wishes, as "may he do this," *hoc faciat*; (2) in a final clause, as *hoc facio ut valeat*, "in order that he may be well." Otherwise, "may" is translated by *licet* when equivalent to "it is permitted," or by *potest fieri ut* when equivalent to "it can be that"—for example, *ei hoc dicere licet*, "he may say this;" *potest fieri ut sapiens sit*, "he may be wise."

The pluperfect subjunctive is translated by "should have" when it occurs in a principal sentence, otherwise the pluperfect indicative in English generally translates it. Remember that the Latins are fond of the subjunctive, the English are not.

The two English translations of the Latin perfect should be noted. The context decides which is to be used. It should be remembered that the perfect with "have" is regarded as a primary tense, the perfect without "have" as a secondary tense.

In the syntax, note the remains of the locative case in names of towns and small islands—*domi*, *ruri*, *terre marique*, *militiæ*. Note the mode of expression when the word *urbs* or *oppidum* is used, as in *urbe Londinio*, "in the city of London." Note that motion "from" is normally expressed by the ablative with a preposition, except in the names of towns or small islands. "By," after a passive verb, if used (1) with the agent, is translated by *a* or *ab* (with the ablative, *ab* is used before vowels or "h"); (2) if used with the instrument, is not translated, and the ablative alone is employed. With regard to the method of expressing price, the genitive is used for indefinite, the ablative for definite (and sometimes indefinite) price, as *hoc pluris vendidit*, *hoc decem sestertiis vendidit*. Learn the distinction between the ablative and genitive of quality, noting that the nouns in the ablative or genitive must have an adjective—for example, "a man of bravery" is not *vir fortitudine*, but *vir fortis*. The genitive of quality refers only to internal qualities.

The ablative of attendant circumstances, or ablative absolute, is very important. The examples of it given in the grammar are well worth studying. The following are the limits to its use:—(1.) The subject of it must be independent of the rest of the sentence—for example, *eo absente Cæsarem laudavit*, "he praised Cæsar in his (Cæsar's) absence," is not to be imitated where *eo* refers to *Cæsarem*. The sentence should run, *Cæsarem absentem laudavit*. (2.) The ablative absolute should be a short clause.

Poetical and Greek usages of the genitive and ablative are important. Note the following:—(1) Genitive of respect, *integer vitæ*, "upright in life;" (2) genitive of separation, *desine querelarum*, "cease from complaints;" (3) genitive of cause, *notus in fratres paterni animi*, "known on account of his fatherly feelings towards his brothers;" (4) ablative of place without a preposition. Note the different methods of translating the preposition "with" into Latin. The constructions of *dignus*, *indignus*, *contentus*, and *fretus* are important. Students should avoid using *dignus* and *indignus* with genitive, as that construction is not found in Cicero. Distinguish the subjective and objective genitive—for example, *amor patris*, "the love felt by a father" (the father is the subject of the love), subjective genitive; *amor patris*, "the love felt for a father" (the father is the object of the love), objective genitive. The predicative genitive is the genitive used as a predicate with the verb *est*, as *boni est hoc facere*, "it is the mark (sign, characteristic) of a good man to do this." Note the constructions of interest—*rĕfert*, *circumdo*, *induo*, *fruor*, *fungor*, *vescor*, *nitor*, *opus est*, *interdico*. The classes of verbs that are followed by the genitive or ablative are important. Among the principal genitives expressing offences, which accompany verbs and adjectives of accusing, note the following:—*repetundarum* (extortion), *veneni* (poisoning), *maiestatis* (high treason—the full phrase is *laesae maiestatis*), *ambitus* (bribery), *furti* (theft), *cædis* (murder), *peculatus* (embezzlement), *homicidi* (manslaughter). Note—"to accuse of violence or assassination," *de vi*, *inter sicarios accusare*. Note the partitive genitive, remembering that "all of us" is not expressed in Latin by *omnes nostrum*, but by *nos omnes*; as "of us" is not a real partitive genitive, since "all" is co-extensive with "us," and not a part of it. Note *ad Vestæ ventum est* (where *templum* is omitted), "he came to the temple of Vesta." (Literally, "it was come to the temple of Vesta.") Note that the ablative expresses (1) point of time; (2) time within which an event happens. Also note the different ways of translating "three days after."

Typical Sentences.

10. "All of us were afraid that the citizens would prevent the general from taking by storm the city of Thebes."

Omnes timebamus ne quominus urbem Thebas expugnaret cives imperatorem prohiberent.

Notes.—(*a*) "All of us" must *not* be translated by *omnes nostrum*, as "of us" is not a true partitive genitive, but "all" and "us" are co-extensive; hence say "we all:" the "we" can be omitted, as it is contained in the termination of the verb. (*b*) After verbs of fearing, a "that" clause is expressed by *ne* and the subjunctive, a "that not" clause by *ut* (or *ne non*) and the subjunctive; an infinitive in English is expressed by an infinitive in Latin. *Ut* after a verb of fearing really means "how;" and if you say, "I fear how he is to do this," it is equivalent to, "I fear he will not do this." (*c*) For the tense of *prohiberent* see sentence 4. The act of "preventing" is future to that of "fearing." In the same way the act of "taking by storm" is future to that of "preventing," therefore we have the imperfect subjunctive. (*d*) Note *Thebas* in apposition to *urbem*, instead of being in the genitive, as you would expect from the English.

11. "Hannibal, instead of following up the troops of Rome, determined to go into winter quarters at Capua."

Hannibal cum copias Romanas posset Capuam in hiberna ire statuit.

Notes.—(*a*) "Instead of," followed by a verbal noun in English, must not be translated by *pro* and the gerund in Latin. There are two or three ways of expressing it—(1) by *cum*.....*posset* when neglected opportunity is implied; (2) by *cum*.....*deberet* when neglected duty is implied; (3) by *adeo non* (to such a degree not) .....*ut* ("that") and subjunctive. It is, of course, sometimes hard to say which is the meaning, and the student will have to exercise his judgment on the point. (*b*) Don't translate "at Capua" by the genitive. This prepositional phrase, which in English qualifies the noun "quarters," in Latin must be attached to the verb, and translated as if the English were "to Capua." (*c*) The verbs *statuo* and *constituo* are followed by the infinitive when the subject of the following verb is the same as their subject, otherwise by *ut* and the subjunctive.

12. "Do not advise my father to put trust in such men as these, if you wish to consult the interests of your country."

Ne patrem meum monueris (or *noli*.....*monere*) *ut his talibus fidem habeat, si patriæ tuæ consulere vis.*

Notes.—(*a*) A prohibition in the second person must *not* be expressed by *non* and the imperative: *ne* and the imperative would be poetical; *noli* (or *nolite*) with the infinitive, or *ne* with the perfect subjunctive, are the ways adopted in prose: *ne* with the present subjunctive is used when no particular person is addressed (hence called the "ideal" subjunctive), compare "thou" in "thou shalt not kill." (*b*) *Ut* with the subjunctive is used to express the English infinitive after verbs denoting "ask," "command," etc. (*c*) *Monueris* is here a primary tense, hence the present subjunctive *habeat* (see sentence 4). (*d*) *Fidem habere* is followed by dative. (*e*) "Such men as these" = "these such men:" *talis* = "such" before a noun; *tam* = "such" or "so" before an adjective or adverb. (*f*) The indicative is used after *si* when there is an indicative or imperative used in the apodosis (principal clause): the subjunctive here is an imperative subjunctive. (*g*) *Consulere* with dative = "to consult the interests of." (*h*) Native country, *patria*.

13. "The soldiers cannot help thinking that it is of great importance to us and to the state that the citizens of London should be spared."

Milites non possunt quin arbitrentur (*sentiant*) *nostra et civitatis magni interesse ut civibus Londiniensibus parcatur.*

Notes.—(*a*) "Cannot help" followed by a verbal noun is expressed in Latin by *non possum quin* followed by the subjunctive. (*b*) *Arbitrari* = "think" followed by the infinitive. (*c*) "It is of importance to" is expressed by *interest*. The person or thing to whom a thing is of importance is expressed by the genitive, except when a personal pronoun represents the person, in which case the ablative feminine singular of the corresponding possessive adjective is used (the genitive, however, of the third non-reflexive personal pronoun is used); hence we have *civitatis* above: "it is my interest" would be expressed by *mea interest*. (*d*) The *thing* that is of interest is expressed either by (1) the infinitive, (2) an *ut* clause with subjunctive, (3) by a neuter pronoun, or (4) by a "*utrum*.....*an*" clause. (*e*) "A citizen of London" is not to be expressed in Latin by *civis Londinii*, but by *civis Londiniensis*. In such cases an adjective is to be employed. (*f*) *Parco* has to be used impersonally in the passive, as it governs the dative in the active.

Sentences.

(Readers can have their solutions corrected by sending them to Editor Matriculation Course, *P. T.*, and enclosing 7 stamps.)

1. We cannot help telling all of the citizens that we ought to have captured these towns ten days ago.
2. After hearing that one of the consuls had marched to the city of Capua, he determined to go to Naples as quickly as possible to inform our father of this.
3. All of us ought to have prevented such men as these from pitching their camp near the city of Thebes, twelve miles from the camp of Pompeius.
4. Who was afraid that they would not arrive at Athens so as to prevent the troops from murdering the helpless women?
5. I had no hesitation in saying that it is our interest, as well as the interest of all patriotic (*bonus*) citizens, to help such a man as this.
6. Instead of making it his aim to save the state, he actually formed the design of helping the enemy.
7. Do not let him know why we shall place all our hopes of safety in flight.
8. Having fought an engagement, Cæsar broke up his camp (*movere castra*) and advanced by forced marches to the town of Marseilles (*Massilia*).
9. Instead of praising the words of these heroes, they actually blamed them.
10. It is a matter of great importance to us whether we shall see to-morrow's sun in safety (*tutus*) or not.

Test Paper—Latin.

(Readers can have their solutions corrected by sending them to Editor Matriculation Course, *P. T.*, and enclosing 7 stamps.)

1. Give the genitive singular and plural (when found) and the gender of the following words:—*palus* (2), *pecus* (2), *vas* (2), *iuvenis*, *acer*, *crus*, *volnus*. Mark the quantity of each vowel except in the case of the vowels long by position.
2. Give the Latin for 1000 women; 2000 sailors; 2320 men; 2001 soldiers; $\frac{1}{2}$; $\frac{3}{4}$; $\frac{2}{3}$; $\frac{7}{8}$; 300 times; 40 a piece; twice eleven are twenty-two.
3. Explain the formation of desiderative, inceptive, and frequentative verbs. Give examples.
4. Explain the terms:—quasi-passive, deponent, and semi-deponent verbs. Give examples.
5. What participles do deponent verbs possess which other verbs do not? How are these deficiencies supplied in ordinary verbs? Give examples.
6. Mention (with one example) the chief syntactical usages of the accusative and dative.
7. Explain the terms:—cognate accusative, predicative dative, subjective genitive, objective genitive, ethical dative, predicative genitive.
8. If a verb governs two accusatives in the active, what becomes of the two accusatives when the verb becomes passive? Illustrate your answer by examples.

Matriculation History.—Gardiner's History (Longmans) is undoubtedly the best. Vol. I. begins B.C. 55 and goes on to A.D. 1509; Vol. II., 1509 to 1689. The reading required for last eleven years can be continued in Vol. III. of Gardiner, or in any other good text-book.

Exercises received for correction bearing postmark "Manly Glam." Will sender kindly forward to Mr. Kerin name and full address?—ED.

SCIENCE NOTES.

Hypnotism and its Influence.—Dr. Jules Voisin will preside at the International Congress on Hypnotism that is to be held at Paris, August 12 to 16, 1900. The following questions will be discussed:—(1) The formation of a vocabulary for the terminology of hypnotism and its phenomena; (2) the relations that exist between hypnotism and hysteria; (3) the application of hypnotism to general therapeutics; (4) the indications for hypnotism, and suggestions in the treatment of mental disease and alcoholism; (5) the application of hypnotism to general pedagogy and mental orthopedics; (6) the value of hypnotism as a means of psychological investigation; (7) hypnotism in relation to the French law of November 30, 1892, regarding the practice of medicine; (8) suggestion and hypnotism in relation to jurisprudence; (9) special responsibilities arising from the practice of experimental hypnotism. The conference promises to be a very interesting one, especially to psychologists.

Heredity in Plants.—M. Casmir de Candolle is of opinion that there is a constant difference between the normal and adventitious buds of trees. While the former are simply organs for prolonging the life of the individual, he regards the latter as new individuals of the same species as the tree from which they spring, or as apogamic embryos. He gives as examples *Eucalyptus globulus*, the walnut, the horse-chestnut, and the hornbeam. In all these trees the first leaves from adventitious buds resemble, not the leaves from normal buds, but the first leaves of the young plant.

The New School of Science in Essex.—The school of science established by the Countess of Warwick and Professor Meldola at Bigods, near Dunmow, in Essex, forms a marked advance in the history of rural education. It is a secondary school, in which modern languages, grammar, geography, and history are taught. Fifteen hours a week are given to the practical teaching of science in field and laboratory. The Essex County Council grants this school £100 a year.

A New Fire-Alarm Apparatus.—From America there comes a new electrical and chemical fire-alarm apparatus, which gives its indications when the atmosphere is so vitiated with smoke that it will not support the combustion of a gas flame. In the apparatus a thermostatic bar is constantly warmed by a small gas flame, the electric circuit through the apparatus being normally open as long as the flame continues to burn. When the air in any room in which the apparatus is installed becomes vitiated with smoke, the little gas flame goes out, and the thermostatic bar cools off, closes the circuit, and gives the alarm.

The Phœnicians and the Tin Trade of Britain.—The vexed question of the age of the tin trade with Cornwall in prehistoric Europe has been reopened by Salomon Reinach. These are the conclusions of this anthropologist:—There was an almost exclusively overland trade between the British Islands and Thrace and Macedonia about a thousand years before Christ. Homeric Greece about 800 B.C. knew not only of the Celtic name of the Cassiterides, but of the phenomenon of the short nights of the north of Britain. The overland tin was brought to the Ægean by barbarians, who sought a marine route in order to retain this trade in their own hands. Reinach says that the legendary Midas of Phrygia, who invented the anchor, was the first to bring tin and lead to Greece by sea by the north-west route. Later the Phœnicians got the tin trade into their hands.

Bats and their Prey.—Mr. Oldham, in a recent number of *The Zoologist*, gives an interesting account of the manner in which bats secure their prey. While they are walking they carry the tail curved downwards and forwards, so that the membrane connecting the tail with the hind legs forms a kind of bag or pouch. When a large insect is encountered, the bat snatches it; then slightly spreading its folded wings, and pressing them on the ground in order to steady itself, it brings its feet forward so as to increase the capacity of the tail pouch. Then it pushes the insect into the bag by bending its neck and thrusting its head beneath the body. The poor insect often struggles violently, but seldom gets away. Mr. Oldham assumes that the same method of capture is employed when on the wing. When the long-eared bat picks moths off sallows, "the bat always hovers when taking off the moth, and bends up the tail so as to form a receptacle for the insect as it drops."

A New Soluble Vegetable Ferment.—At a recent meeting of the Paris Academy of Sciences, an interesting communication was made by MM. E. Bourquelot and H. Hérissey on the germination of the seed of the carob and the production of mannose by a soluble ferment. They find that during the germination of the carob seed there is a soluble ferment produced, which acts on the stored albumen in a similar manner to the way diastase acts on amylaceous albumens. Mannose and galactose are the products of the action of this ferment.

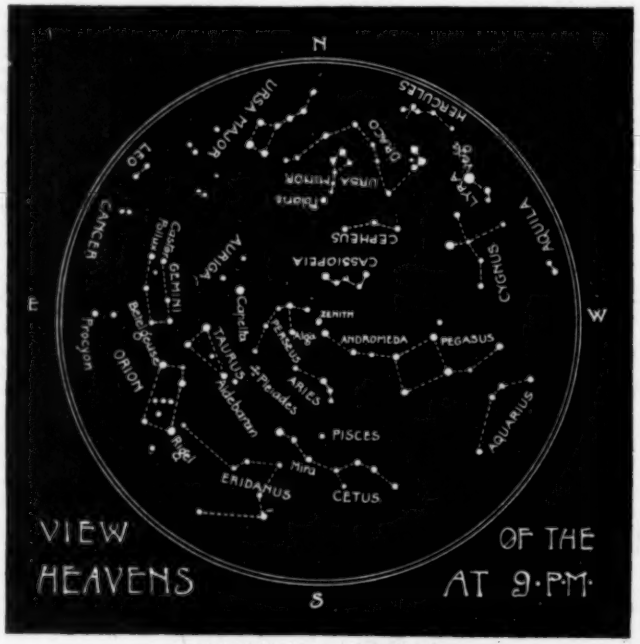
OUR SCIENCE SECTION

☞ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this Number.**

STAR STUDY
FOR SCHOLARSHIP STUDENTS.

I.—DECEMBER.

AT the next Queen's Scholarship Examination two papers will be set in elementary science, the maximum marks for each paper being fifty. In these days of keen competition, no candidate can afford to ignore a subject which offers such an inducement as a possible hundred marks. Hence we presume that every fourth-year pupil teacher is giving attention to elementary science. The syllabus very rightly insists that the chemistry and physics should be studied experimentally, and goes on to state that "*It is expected also that candidates shall be trained to notice and record the positions of the various heavenly bodies.*" The aim of this star-column is to enable pupil teachers to fulfil this reasonable expectation. Each month we shall publish a star map, giving the positions of the chief constellations at nine o'clock in the evening; and the student is advised to master these maps and the accompanying letter-press month by month, to the end that he may have the training referred to in the syllabus. It is suggested that, in addition to a recognition of the stars as set out in this place, the candidate should learn to draw the maps from memory, so as to be able to reproduce the relative positions of the chief constellations on paper at the examination, if need be.



STAR MAP NO. I. (DECEMBER).

Before referring to the map, it will be advisable to give a few preliminary words of explanation.

An examination of the heavens will show that the stars are arranged in groups. This was observed by the ancients, who further found a resemblance, more or less real, in the shape of the star groups to the shape of various natural objects, after which the star groups, or **constellations** as they are termed, are named. If the student stands with his face turned towards that part of the sky (the south) where the sun appears at noon, in a position that gives an uninterrupted view of that part of the horizon which is on his left hand (the east), he will observe that the stars appearing there are not always the same. A star rises and makes a progression across the heavens, followed by others in its wake. If he follows a particular star, he will find that, like the sun, it rises in the east, culminates in the south, and finally sinks down into the west. The student will easily guess that this apparent movement of the stars is due to the real rotation of the earth on her axis. Other stars there are that change their position, it is true, but neither rise nor set, simply describing a circle round one star that does not move at all, the well-known Pole Star, so called because it is very nearly at the point where the North Pole of the earth's axis would touch the vault of heaven, or celestial sphere as it is called, if the axis were produced sufficiently. Stars, then, may be divided into two classes with respect to their apparent motion—namely, those that revolve round the Pole Star, and never rise or set—**Circumpolar Stars**—and those that rise and set regularly.

The Names of the Constellations.—These may best be taken in two divisions; and first of all come the stars which lie in the annual path of the sun round the heavens—the **Ecliptic.** These are called the **Zodiacal Constellations**, because the star groups lying in the belt 9° above and below the ecliptic are mainly named after animals (Gr. ζῶδιον animal), to which they were supposed to have a resemblance. These constellations are twelve in number. Their English names may easily be learned from the following doggerel. The Latin equivalents are supplied below, and these the student must become well acquainted with.

"The Ram, the Bull, the Heavenly Twins,
And next the Crab the Lion shines,
The Virgin and the Scales,
The Scorpion, Archer, and He-goat,
The Man that bears the watering-pot,
And Fish with glittering tails."

Latin Equivalents.

1. *Aries*, the Ram.
2. *Taurus*, the Bull.
3. *Gemini*, the Twins.
4. *Cancer*, the Crab.
5. *Leo*, the Lion.
6. *Virgo*, the Virgin.
7. *Libra*, the Scales.
8. *Scorpio*, the Scorpion.
9. *Sagittarius*, the Archer.
10. *Capricornus*, the Goat.
11. *Aquarius*, the Water-bearer.
12. *Pisces*, the Fish.

The remainder of the star-groups visible in our northern skies are known as the northern constellations. The only zodiacal constellations visible at 9 p.m. during December are Aries, Taurus, Gemini, Cancer, Leo, Capricornus, Aquarius, and Pisces. The student may attempt to locate these from the map. We shall give later on directions how to find them, but this month we shall devote our space to the Great Bear (Ursa Major), the Little Bear (Ursa Minor), Cassiopeia, Pegasus, Andromeda, Perseus, Taurus, Auriga, and Orion.

The Great Bear, the well-known group of seven stars, will be found low down in the north. The two southernmost stars are to be joined, in imagination, by a line which, being continued to the west, leads to the Pole Star (Polaris). About the same distance on the opposite side of Polaris is a group of five stars, forming a rough **W**. This is Cassiopeia (the Lady's Chair). Drawing a line now from Polaris so that it just escapes the most westerly of the five stars, and continuing about the same distance as

Cassiopeia is from Polaris, a large square formed by four stars is reached. This is the great square of Pegasus, the most easterly star of which, however, belongs to the constellation Andromeda. A slightly-curved line drawn from this star will include the two other prominent stars in Andromeda, and will lead to the star pendant forming the constellation Perseus, lying just under Cassiopeia. Joining the three stars in Perseus that are in an oblique straight line, and branching this line off in a curve to the right and a curve to the left, we shall have located the constellation Taurus, to the right of which the star cluster, the Pleiades, forms the best-known group, and Auriga to the left, the bright star of which is Capella. A line drawn from Polaris to Capella, and continued to the south-east, leads to the magnificent, trapezium-shaped Orion, with the three stars in the middle forming the famous Belt of Orion.

Next month we shall discuss the chief stars of the constellations above referred to, and shall proceed to the identification of other groups. Meanwhile we conclude by stating that the circumpolar constellations amongst those named in the foregoing list are Ursa Major, Cassiopeia, Auriga, and Perseus.

CHEMISTRY NOTES.

BY THOMAS CARTWRIGHT, B.A., B.SC. (LOND.),

First Class Honoursman in Chemistry; Lecturer on Chemistry to the Middlesex County Council; Author of "Elementary Practical Chemistry," etc.

Action of Mg on Water.—It is tacitly assumed in most works on chemistry that magnesium does not decompose water at ordinary temperatures, although it is known to decompose it at high temperatures. Mr. Bryant, B.A., B.Sc., of King's School, Pontefract, shows that this is a fallacy. Magnesium powder, when placed in cold water, at once decomposes it, as may be seen by placing a few magnesium filings in a tube filled with water, and inverting the tube in a vessel containing water. The powder is seen to become more and more flocculent, and after a few seconds the whole mass rises to the top. If it is shaken down, a bubble of gas is left behind; masses of the filings keep rising and falling, and small bubbles ascend rapidly for some time. After a few minutes the action slackens; but by shaking, abundant bubbles can be obtained, the action continuing for some time with little energy. The gas is pure hydrogen. From 0·1 gram of powder in 100 c.c. of water from 2 to 3 c.c. of hydrogen can be obtained; from the same amount of metal in 550 c.c. of water 5·5 c.c. of hydrogen were got. The action of magnesium on boiling water is more rapid, but it is more quickly ended, the amount of the gas evolved being very little more than in the case of cold water. Mr. Bryant has taken great pains to show that it is the magnesium, and not any other body accidentally present, that decomposes the water, and there seems little doubt but that his claim is a just one. It is interesting to note that Würtz says pure cold water is decomposed by magnesium. A full account of Mr. Bryant's experiments is given in *The Chemical News* for 3rd November.

Hypophosphite of Copper.—Mons. Engel has succeeded in preparing this substance, which hitherto has not been obtained owing to the facility with which hypophosphorus acid reduces copper salts. The preparation consists in precipitating a solution of copper sulphate by the molecular equivalent of a solution of hypophosphite of barium. The precipitated sulphate of barium can be filtered off, and the solution can be evaporated in air over H_2SO_4. The solid salt is white, and when anhydrous has the formula $(PO_2H_2)_2Cu$. Precipitated palladium decomposes copper hypophosphite in the cold, metallic copper being deposited and hydrogen evolved, the reaction being represented by the equation—

$$(PO_2H_2)_2Cu + 2H_2O = Cu + 2PO_3H_3 + H_4.$$

The Chlorobromides of Tungsten.—M. Defacen finds it impossible to prepare hexabromide of tungsten by the action of liquid hypobromic acid on the hexachloride in sealed tubes kept at a temperature of 70°; but he has prepared two chlorobromides: one, the more stable of the two, is formed at about 70°, and is the hexachloro-trihexabromide $WCl_3 3WBr_6$; the other is obtained at a temperature of 15°, and is the hexachlorobromide WCl_6WBr_6. These two compounds are the first known chlorobromides of tungsten. The former substance is green, and composed of a mass of small crystals which melt at 232°; on exposure to air it rapidly alters, turning brown in colour.

Alloys of Pt and Pd with Cd, Zn, and Mg.—Professor Hodgkinson and Captains Waring and Desborough read a paper on this subject at the Dover meeting of the British Association. The authors state that they submitted a weighed amount of Pt to the vapour of the volatile metal, keeping the Pt and the compound formed at a temperature above the boiling-point of the volatile metal. Two plans have been tried—one carrying the vapour of the volatile metal with hydrogen, another heating the metals in a vacuum. Two porcelain boats—the one containing the Pt or Pd, the other the volatile metal in excess—were placed close to each other in an infusible Jena tube, and were heated strongly in a combustion furnace; and where the hydrogen was used, this gas was passed over the volatile metal towards the Pt or Pd. The following were the results obtained:—

Cadmium.—The alloy formed corresponds almost exactly to the formula $PtCd_2$. It is a white, crystalline, and very brittle solid. The same compound was obtained by both the hydrogen and the vacuum methods.

Zinc.—The action was slower than with Cd. The heat registered was so great that the tube began to give way. The compound formed appeared to be PtZn, which was obtained apparently by both methods. The alloy is crystalline, and very brittle.

Magnesium.—This was the most difficult of the reactions, because, at the temperature employed, the magnesium vapour is almost entirely absorbed by the glass of the tube and by the porcelain boat. Some magnesium was distilled in a vacuum; this was placed in a porcelain boat lined with MgO, the Pt was placed as close as possible, and the whole was heated until the Mg melted: a gentle current of very dry hydrogen was then kept up for several hours. An extremely friable crystalline alloy was produced, which appeared to correspond to the formula $PtMg_2$.

Palladium fails to give the same results, and nickel acts very much as Pd.

Action of KI in Solution on Hg_2I_2.—The iodide of potassium decomposes Hg_2I_2 into mercury and dissolved mercurous iodide, the composition being complete or incomplete according to the conditions of the experiment.

Complete Decomposition.—This results when the KI is used in large quantity—for example, if 2 grams of mercurous iodide are used with 20 c.c. of the normal solution of KI. The insoluble portion is formed entirely of small globules of mercury.

Incomplete Decomposition.—If the quantity of mercurous iodide is more considerable, a portion only is decomposed. The insoluble portion is a greenish-yellow powder, formed of a mixture of mercurous iodide and finely-divided mercury. This is what happens, for example, when 20 c.c. of the normal solution of KI is agitated with 6·54 grams of mercurous iodide. The actual proportions used are those corresponding to the following equation:—

$$Hg_2I_2 + 2KI = HgI_2 2KI + Hg,$$

by which is represented generally the action of KI on Hg_2I_2. The action is thus limited. Whatever may be the proportions used, when the decomposition stops and equilibrium is reached, 100 grams of the supernatant liquid contains 11·9 grams of HgI_2 in solution at a temperature of 20°.

Inverse Action.—If we saturate a certain quantity of the normal solution of KI at 20° with HgI_2, this solution, when placed in contact with metallic mercury, attacks it in the cold, and mercurous iodide is formed in abundance. But this inverse formation of mercurous iodide stops of itself when a large proportion of Hg_2I_2 is present in the solution.

Note on Analysis.—Sufficient attention is not paid to the meaning of what happens when a mixture which is to be analysed is dissolved. The first step should be to dissolve all or part of the mixture in water; and this division of a mixture into parts soluble and parts insoluble in water is of great importance as respects the acids that should be sought. For instance, suppose a metal of Group V. is found in the water solution: then *any acid* may be present; whereas, if a metal of any other of the groups is present, then, as a rule, to which, however, there are notable exceptions—still, as a rule, the acids to be sought for are nitrate, sulphate, and chloride. Should the mixture dissolve in HCl and not at all in water, no member of Group V. is likely to be present, and the substance will probably be oxide, carbonate, phosphate, arseniate, sulphide, sulphite or borate of a metal not of the fifth group. By attending to this preliminary and seemingly unimportant consideration, the analyst will save himself much time, and avoid much vexation of spirit.

Whether the water has or has not dissolved any part of the mixture may readily be determined by evaporating a small amount of the water upon a piece of platinum foil.

ELECTRICITY AND MAGNETISM.

BY EDWIN EDSER, A.R.C.S., F.PH.S.

MEASUREMENT OF RESISTANCE.

Some of the most important methods of measuring the electrical resistance of conductors will here be considered, together with precautions that must be taken, and corrections that must be applied, when great accuracy is sought.

The British Association or Metre Bridge.—This consists of a straight wire, AB (Fig. 1), of uniform sectional area, one metre

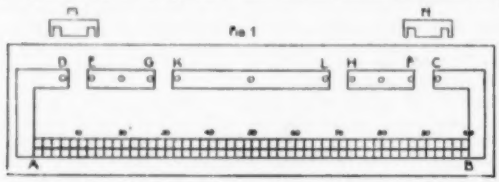


Fig. 1

in length, soldered at its ends to the copper strips BC and AD. EG, KL, and HF are also copper strips; terminals are provided at D, E, G, K, L, H, F, and C, and also with terminals at the centre points of the strips, as indicated by the small circles in Fig. 1. There are thus four gaps—DE, GK, LH, and FC. Of these, DE and FC are, for some experiments, closed with small slotted copper strips represented by M and N in the figure. A sliding key is also provided, on depressing which contact is made with the wire AB. It is possible, when due precautions have been observed, to effect most accurate resistance measurements with the metre bridge. The method of conducting an experiment is as follows:—

Simplest Method of Measuring Resistance.—The gaps DE and FC are closed by means of the slotted copper strips; a standard resistance coil is connected to the terminals G and K, and the resistance to be measured is connected to the terminals L and H. The poles of a battery (such as a Leclanche cell) are connected to the central terminals in the strips EG and HF, and one terminal of a sensitive galvanometer is connected with the terminal in the centre of KL, whilst the other galvanometer terminal is connected with the sliding key, by means of which contact can be made with any point on the wire AB.

The whole arrangement is electrically equivalent to that represented in Fig. 2. The current leaving the battery enters

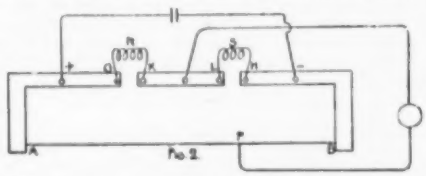


Fig. 2

the terminal marked +, and then divides into two parts. Part flows along the path + AB −, whilst the remainder of the current flows through the standard coil R, along the copper strip KL, then through the wire S, whose resistance is to be measured, and finally leaves the bridge at the terminal marked −.

From the nature of the connections, it is at once seen that

Fall of potential along path + AB − = fall of potential along path + GKLH − . . . . . (1)

Let us suppose that on depressing the sliding key at a point P on the wire AB the galvanometer indicates no current. Then the terminal at the centre of the copper strip KL must be at the same potential as the point P on the wire. Since the resistance of the copper strips of the bridge is very small, the only fall of potential along the path + GKLH − occurs in the coils R and S. Hence, when the galvanometer indicates no current on depressing the sliding key, we have—

Fall of potential along AP = fall of potential in the coil R . . . . . (2)

The relations (1) and (2) can be represented diagrammatically. Let OX (Fig. 3) represent the length of the bridge wire AB, and let OY represent the potential difference between the bridge terminals represented by + and − in Fig. 2. Then the fall of potential along the wire AB, which is supposed to be uniform, is represented by the inclined straight line YX. Since the fall of potential along the path + GKLH − is equal to that along the path + AB − (Fig. 2), we may let the inclined straight line YR (Fig. 3) represent the fall of potential in the coil R (Fig. 2), whilst SX (Fig. 3) represents the fall of potential in the coil S (Fig. 2). The line RS (Fig. 3) represents the constant potential along the copper strip KL (Fig. 2). Since this strip possesses no appreciable resistance, there will be no appreciable fall of potential along it; hence RS is parallel to OX.

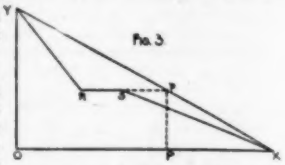


Fig. 3

Produce the line RS (Fig. 3) till it cuts the inclined straight line YX in the point *p*. Then the point P on the wire will be at the same potential as the strip KL (Fig. 2); consequently, if a galvanometer is connected between these points, no deflection will be produced.

Let R = resistance of standard coil inserted in gap GH.

Let S = unknown resistance of coil inserted in gap LH.

Let r = resistance of one centimetre length of bridge wire.

Let P be the point at which the sliding key may be depressed without producing any deflection of the galvanometer; and let the length PB = l_1, length AP = l_2.

Then resistance of wire AP = $l_2 r$;

resistance of wire PB = $l_1 r$.

Let C be the current along the path + GKLH −, and let c be the current along the path + AB −. Then

Total fall of potential along path + GKLH − = C(R + S).

Total fall of potential along path + AB − = $c(l_1 r + l_2 r)$ = $cr(l_1 + l_2)$.

From the relation (1) above, $C(R + S) = cr(l_1 + l_2)$ . . (3)

Also, fall of potential due to the flow of the current C through the coil of resistance R = CR.

Fall of potential between the points A and P on the bridge wire, due to flow of current c through a resistance $l_2 r = cl_2 r$.

From the relation (2) above we have—

$$CR = cl_2 r \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

Divide (3) by (4), thus eliminating the unknown currents C and c. Then—

$$\frac{R + S}{R} = \frac{r(l_1 + l_2)}{l_2 r} = \frac{l_1 + l_2}{l_2}.$$

$$\therefore 1 + \frac{S}{R} = 1 + \frac{l_1}{l_2}.$$

$$\therefore \frac{S}{R} = \frac{l_1}{l_2}, \text{ and } S = \frac{l_1}{l_2} R \quad . \quad . \quad . \quad . \quad . \quad (5)$$

Expressed in words, this result means that the ratio of the resistance S to the resistance R is equal to the ratio of the resistance of the wire PB (Fig. 2) to the resistance of the wire AP.

In this investigation it has been assumed that—

1. The resistance of the copper strips is negligibly small. This will be the case if those strips possess considerable sectional area.

2. That no resistance is introduced at the connections A and B between the bridge wire and the copper strips. This will only be the case when the wire has been carefully soldered: a special test must be applied to determine whether this is so.

3. It has been assumed that each centimetre length of the wire possesses the same resistance r. This is never exactly the case, even when the wire has been carefully drawn and annealed. For accurate work the bridge wire must be calibrated—that is, the resistance per unit length at different parts of the wire must be determined.

It is of great importance that the resistance of the bridge wire should be as little affected by temperature as possible. If the wire were perfectly uniform, and could be accurately maintained at a uniform temperature throughout its length, variations in this temperature would produce no effect, since r, the resistance per centimetre length of the wire, does not occur in the final equation (5). Again, it is impossible to be certain that the temperature of the bridge wire is uniform throughout its length; hence a wire must be chosen of such a material that its resistance is as little affected by temperature as possible.

The best substance for this wire is an alloy of platinum and silver, which, besides possessing a very small variation of resistance with temperature, is very hard, and therefore unlikely to be injured mechanically, and, further, is not oxidised under ordinary conditions. This alloy is, however, very expensive.

Another alloy frequently used is *platinoid*. This consists of an alloy of copper, zinc, nickel, and tungsten. Its resistance varies only slightly with the temperature, and it is hard and not easily oxidised.

Manganin, an alloy of copper, nickel, and manganese, is perhaps preferable to platinoid.

German silver has a smaller temperature variation of resistance than copper, but is not so good in this respect as platinoid. Platinoid is German silver with a small amount of tungsten.

(*To be continued.*)

MATHEMATICS.

STAGES 2 AND 3, SCIENCE AND ART DEPARTMENT.

BY G. A. BAXANDALL,

Assistant, Mathematical and Mechanical Division, Royal College of Science, London.

Stage 2.

Algebra.

Quadratic Equations.—Hall and Knight, chap. xxv. We recommend the student to abstain from using the formula as in Art. 199, but he should use the method of Art. 201 as much as possible.

C. Smith, Arts. 134 to 142; also 148, 149.

H. Smith, chap. xix.; also Arts. 324 and 333.

Todhunter and Loney, chaps. xxii. and xxiii.

There should be no difficulty in solving any quadratic equation, because there is a straightforward rule for doing this. If the equation involves fractions, there may be a little trouble in reducing to the standard form $ax^2 + bx + c = 0$.

Although we define a quadratic equation as one in which the highest power of x (or whatever letter be used) is the second, yet there are many equations containing higher powers than the second which may be solved in the same way as quadratics, because by a simple substitution they can be reduced to the latter. For example, taking the quadratic

$$x^2 - 5x + 4 = 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

we may write other expressions for x and obtain the following equations, none of which are quadratics, but all of which may be solved, like (1), by letting y stand for whatever takes the place of x in (1), thus—

$$(x^2)^2 - 5x^2 + 4 = 0, \text{ or } x^4 - 5x^2 + 4 = 0.$$

$$(x^2 - x)^2 - 5(x^2 - x) + 4 = 0, \text{ or } x^4 - 2x^3 - 4x^2 + 5x + 4 = 0.$$

$$\left(x + \frac{1}{x}\right)^2 - 5\left(x + \frac{1}{x}\right) + 4 = 0, \text{ or } x^2 + \frac{1}{x^2} - 5x - \frac{5}{x} + 6 = 0.$$

$$(x^2 + 3x) + 4\,\frac{1}{x^2 + 3x} - 5 = 0.$$

And so on.

Equation (1) above may be written as

$$(x - 4)(x - 1) = 0;$$

hence x is either 4 or 1. That is, $x^2 - 5x + 4$ reduces to zero when 4 or 1 is put for x.

Conversely, if we know that 1 satisfies equation (1), we are certain that $(x - 1)$ must be a factor of $x^2 - 5x + 4$. Let the student be quite sure of this.

Taking the equation $x^4 - 4x + 3 = 0$: if we try 1 for x, we find that $x^4 - 4x + 3$ becomes zero; therefore $x - 1$ is a factor, and, by division, $x^3 + x^2 + x - 3$ is the other factor. Again, try 1 for x, and $x^3 + x^2 + x - 3$ becomes zero: hence one of its factors is $x - 1$, and the other is easily found to be $x^2 + 2x + 3$. Accordingly the original equation becomes

$$(x - 1)(x - 1)(x^2 + 2x + 3) = 0.$$

From this we know that $x^2 + 2x + 3$ *may* be zero; and solving $x^2 + 2x + 3 = 0$, we obtain the imaginary values $\pm\sqrt{-2} - 1$. Hence the solution of $x^4 - 4x + 3 = 0$ gives $x = 1, 1, \pm\sqrt{-2} - 1$.

The student may as well observe that people who make equations like $x^4 - 4x + 3 = 0$ expect him to try if 1, or -1, or 2, or 3, etc., will satisfy the equation.

Work the following:—

1. Solve the equations—

(1) $x^3 - 6x^2 + 11x - 6 = 0$.

(2) $x^3 - 2x + 1 = 0$.

Ans. (1) 1, 2, 3; (2) 1, $\frac{\sqrt{5} - 1}{2}$, $-\frac{\sqrt{5} - 1}{2}$.

2. Divide £1015 among A, B, C so that B shall receive £5 less than A, and C as many times B's share as there are shillings in A's share. Ans. £10, £5, £1000.

3. Find all the roots of $x + \frac{4a}{x + 1} = 2a + 1$, and also of $ax^2 - x + a = 1$.

Ans. 1, $2a - 1$; $\frac{1}{2} \pm \sqrt{\frac{4 - 3a}{4a}}$.

Work also about *twenty* quadratic equations selected from the various sets of examples given in the text-books.

Trigonometry.

Read Hall and Knight, Arts. 33, 22 to 30: chaps. v. and viii. Loney, Arts. 31, 27, 46 to 52; chap. v.

Lock, chaps. vii. and ix.

Hamblin Smith, chaps. ix. and x.

Work examples selected from the various sets provided in the text-books.

We refer the reader to the above chapters and articles with the object of drawing his attention to four things:—

1. When any one ratio of an angle is given, the values of the others can be found.

In working examples on this, a right-angled triangle should be drawn, and the results obtained by means of this.

2. There are simple relations existing between the trigonometrical ratios, because the latter are defined in terms of the sides of a right-angled triangle, and these sides are related, as shown in Euclid, I. 47. A student will make little progress in trigonometry if he is not thoroughly familiar with the relation

$$\sin^2 A + \cos^2 A = 1,$$

$$\text{or } 1 - \sin^2 A = \cos^2 A, \text{ and } 1 - \cos^2 A = \sin^2 A.$$

The exercises on identities to be found in all the text-books are set with the object of providing a good drilling in these relations. There is, however, more algebra than trigonometry involved in the working of these identities.

3. The solution of the right-angled triangle.

If ABC be a right-angled triangle, with the right angle at C, then

$$\frac{AC}{AB} = \sin B, \text{ and } \frac{BC}{AB} = \cos B.$$

$$\therefore AC = AB \sin B, \text{ and } BC = AB \cos B.$$

It will be a great help to a student in his mathematical work if he can become accustomed to writing the last two statements without the help of the first two.

For example, if AB = 2·34 and B = 38°, then

$$AC = 2{\cdot}34 \sin 38^\circ = 2{\cdot}34 \times {\cdot}6157 = 1{\cdot}441,$$

$$BC = 2{\cdot}34 \cos 38^\circ = 2{\cdot}34 \times {\cdot}7880 = 1{\cdot}844.$$

We recommend the student to carefully work out the two following examples, which will give him practice in making the step from hypotenuse to one of the sides, or *vice versâ*. It will be necessary to use, say, the four-figured tables, and it will also be an advantage if he can use the contracted methods of multiplication and division which are to be found in most books on arithmetic.

Ex. 1. In a triangle ABC, the base BC = 12·6, AB = 10·8, and B = 41°. Draw a perpendicular from A, meeting BC in D. Show that the lengths of AD, BD, and CD are 7·086, 8·151, and 4·449. Show that the area of the triangle (that is, $\frac{1}{2}$AD × BC) is 44·64. Now divide AD by DC and obtain the tangent of C, and by means of the tables show that C is nearly 57° 53′, and that therefore A is 180° − 41° − 57° 53′, or 81° 7′. Finally, show that AC is 8·368.

Ex. 2. In a triangle ABC, AB = 18·6, B = 62°, C = 50°. Draw AD perpendicular to BC. Show that AD and BD are 16·42 and 8·733. Seeing that AD divided by AC is sin 50°, show that AC is 21·44. Now show that DC is 13·78, and therefore BC = 22·51. In this way, having given two sides of a triangle and an angle opposite one of these sides, you may find the third angle and the other two sides.

4. The trigonometrical ratios of an angle of any magnitude.

Draw a line OX. Suppose a line to start from OX and revolve to the position OP, tracing out an angle of, say, 130°. What are we to understand by the sine, cosine, and tangent of 130°, and what are their values?

From P draw a perpendicular to OX or this line produced; then (whatever be the angle XOP), we have these definitions:—

$$\sin XOP = \frac{MP}{OP}, \cos XOP = \frac{OM}{OP}, \tan XOP = \frac{MP}{OM},$$

where MP is *positive* when M to P is *upwards*,
and MP is *negative* when M to P is *downwards*;
OM is *positive* when O to M is to the *right*,
and OM is *negative* when O to M is to the *left*.
OP is always regarded as *positive*.

From these conventions it will be seen that sin 130° is *positive*, and the numerical value is MP ÷ OP—that is, sin 50°, or ·766; hence sin 130° = + ·766.

Similarly, cos 130° is − cos 50° = − ·6428, and tan 130° is − tan 50°, or − 1·1918. Thus it will be seen that to obtain the sine, cosine, or tangent of an angle greater than 90°, we first decide whether it is *positive* or *negative*, then we obtain the numerical portion by considering that *acute* angle which OP makes with a *horizontal* line through O.

Ex. 1. Take from the tables the values of the following:—sin 107°, cos 132°, tan 212°, sin 250°, sin 519°, cot 890°.

Ans. ·9563, − ·6691, ·6249, − ·9397, ·3584, − 5·6713.

Observe that in a right-angled triangle the sine of one acute

angle is the same as the cosine of the other. Also the tangent of one is equal to the cotangent of the other. Thus sin 20° = cos 70° ; tan 80° = cot 10°.

Ex. 2. Illustrate that $\sin^2 A + \cos^2 A = 1$ by taking A (1) 25°, (2) 125°.

Geometry.

Read Props. 8 to 14, Book II. The more important of the propositions of Book II. are 4, 5, 6, 7, 11, 12, 13, 14.

Read through the solutions to those riders at the end of Book II. which are worked out in Hall and Knight, particularly Ex. 24. Similarly, observe theorem 11 in Nixon at the end of Book II.

(*Notes on Stage 3 next month.*)

REPLIES TO SCIENCE QUERIES.

Omega.—Reply too long for insertion this month.

If *Bonne Chance* will kindly send name and address to Editor, solution to query will follow by the return post.

W.S.—The examination is held in May. Professor R. A. Gregory's *Elementary Physiography* (T. Nelson and Sons) completely covers the requirements.

F.O.W. (Colchester).—The paragraph quoted in your letter does not apply to science classes, but only to students on the books of a school of science. This you will see by referring again to the article, as the remarks come under the heading, "School of Science Students and Registration." You are quite right in saying that Sir George Kekewich does not propose to abolish the elementary examination in science subjects until after 1900.

Chemistry Honours, Part I.—For the theoretical course we recommend a thorough study of Newth, and an acquaintance with the more important items of new work as set out in our Chemistry Notes. Two of the writer's students who passed Honours, Part I. Theory, in May last, depended entirely on Newth and our notes. The particular item of new work which they were able to do was the reduction of nickel by the carbonyl process, which was duly explained in our notes. The wants of such students as yourself are carefully kept in mind by the writer of the Chemistry Notes. For practical work, Clowes and Coleman's *Elementary Quantitative Analysis*, or any other good work, such as Thorpe's and Sexton's *Quantitative Analysis*. Last year the students had to estimate the copper and the zinc in a specimen of brass.

The questions can be got from the Science and Art Department, South Kensington, price 6d. per set, each set comprising the whole of the questions set in a particular year.

Ted.—Unless you are very strong in mathematics, it will be courting disaster to take pure mathematics as one of the subjects for your final B.Sc. More students fail in this subject than in any other. The paper on conic sections is particularly difficult, and no one book covers the ground. Indeed, it is difficult, in view of the questions that from time to time have been set, to say what may not be required in the examination.

Loney's *Co-ordinate Geometry* (Macmillan), Smith's *Geometrical Conics* (Macmillan), Edwards's *Differential and Integral Calculus*, may be recommended for pure mathematics. If you determine on taking this subject, obtain back questions, and send those which you are unable to solve to the Editor of the query column. Our advice to you, in regard to taking this subject, is emphatically, "*Don't.*"

A better selection would be—

Mixed mathematics.
Chemistry.
Physics.

The papers on the *Calculus* appearing in THE PRACTICAL TEACHER will be useful to you in regard to mixed mathematics. The U.C.C. publish a book on the astronomical part of the subject, and Hicks's work on mechanics can be recommended.

For chemistry, Newth's work (Longmans) may be recommended.

For physics, Watson's *Physics* (Longmans) is the most recent work covering the whole of the ground.

For parts of physics—

Sound (Poynting and Thomson), or Catchpool's *Sound* may be recommended.

Heat, by Edser (Macmillan), or Draper's *Heat* (Blackie) are the best books.

Light, by Emtage, or Preston's *Light*, are the best books.

Magnetism and Electricity.—Hadley's *Electricity and Magnetism* will prove useful if you are a beginner. Other works are—S. P. Thomson's well-known book, Stewart's *Electricity and Magnetism* (U.C.C.), and J. J. Thomson's *Electricity and Magnetism*. The last mentioned book is extremely good, but is rather difficult, and more advanced than is required.

E. L. Cotton.—The relation between pressure, force potential, velocity potential, and resultant velocity is given by—

$$(1.)\quad \int \frac{dp}{\rho} = R - \frac{d\phi}{dt} - \tfrac{1}{2}u^2.$$

$$(2.)\quad \frac{ds}{dt} + \nabla^2\phi = 0.$$

s denotes the condensation, ρ = density, $\therefore\ \rho = \rho_0(1 + s)$, and in the usual manner the symbolical operator ∇^2 denotes $\frac{d^2}{dx^2} + \frac{d^2}{dy^2} + \frac{d^2}{dz^2}$.

$$\therefore\ \nabla^2\phi = \frac{d^2\phi}{dx^2} + \frac{d^2\phi}{dy^2} + \frac{d^2\phi}{dz^2}.$$

Now, if $a^2 = \frac{dp}{d\rho}$, then

$$\frac{d^2\phi}{dt^2} = \frac{dR}{dt} + a^2\nabla^2\phi.$$

From (1) and (2), $\frac{d^2\phi}{dt^2} = a^2\frac{d^2\phi}{dx^2}$.

General solution:—

$$\phi = f(x - at) + F(x + at)$$

represents the propagation of waves in positive and negative directions with a common velocity.

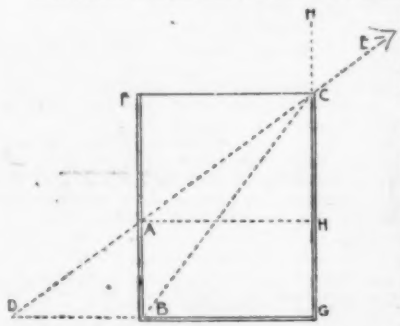
(This is given in Rayleigh's *Sound.*)

We thank you for your letter.

Timothy.—The height of a cylindrical cup is 4 inches, the diameter of its base is 3 inches. A person looks over its rim, so that the lowest point of the opposite side which he can see is 2¼ inches below the top. The cup is then filled with water: looking in the same direction, he can just see the point of the base farthest from him. Find the refractive index of water.

(Aldis' *Optics*, p. 11.)

Let Fig. 1 represent a section of the cup: an eye situate at E sees the point A, 2¼ inches below the upper rim FC of the cup over the rim at C, when the cup is empty. When full of water, the eye sees the point B over the rim at C. It is required to determine the refractive index of the water.



Produce the line CA till it meets the horizontal line BD drawn through B.

When the cup is empty, a ray from A travels along the straight line ACE. When the cup is filled with water, the ray which reaches the eye over the rim of the cup travels along the broken path BCE.

The direction of a light ray is always capable of reversal; consequently, a light ray starting at E, and travelling along EC, will pursue the path ECA when the cup is empty, and the path ECB when the cup is filled with water.

Confining our attention to this ray, we have—

Angle of incidence = I = ∠ ECN = ∠ DCG.

Angle of refraction = R = ∠ BCG.

If μ is the refractive index of the water, we have—

$$\mu = \frac{\sin I}{\sin R} = \frac{\sin DCG}{\sin BCG}.$$

But $$\sin DCG = \frac{DG}{DC}.$$

Draw AH parallel to BC. Then, since the triangles DCG, ACH are similar, we have—

$$\sin I = \sin ACH = \sin DCG = \frac{AH}{AC},$$

and $$\sin R = \frac{BG}{BC},$$

$$\therefore\ \mu = \frac{\sin I}{\sin R} = \frac{AH}{AC} \div \frac{BG}{BC} = \frac{BC}{AC} = \frac{\sqrt{4^2 + 3^2}}{\sqrt{2\cdot25^2 + 3^2}}$$

$$= \frac{5}{3\cdot75} = 1\cdot\dot{3}.$$

CLOUGH'S CORRESPONDENCE COLLEGE.

CERTIFICATE, July 1900.

NEW CLASSES for both FIRST and SECOND YFAR STUDENTS, and also for STUDENTS taking PART I. or PART II., are now commencing. The Courses of Work meet the LATEST REQUIREMENTS, and afford the BEST POSSIBLE PREPARATION for these important EXAMINATIONS.

Among the Letters already to hand from our Students who were Successful in the Certificate Examination last July are the following:—

Black Horse Road, Kingswood, Bristol,
Dear Sir, 1-11-99.

I received notice to-day that in my First Year Certificate Exam. I am classed "**First**" **in both Parts**, with special credit in Mathematics. I feel I must give all the credit to your **magnificent** notes, and more especially to your Test Papers. Some of the questions in the Exam. were so closely akin to those in the Test Papers, that one would almost imagine you knew what was coming. This was especially so in Euclid.

Your Science Notes obtained me a "**First**" in Advanced Physiography last May, and all whom I have persuaded to join your Classes have come out "**First**" in Scholarship and in Sciences taken in your Classes. I shall continue to recommend your Classes to all students.—I am, Sir, yours faithfully,
ALBERT E. BATEMAN.

Herringthorpe Park, Rotherham,
Dear Mr. Clough, November 1, 1899.

I received this morning the result of the Certificate Examination, and am pleased to be able to say that in the Second Year Papers I am classed in **Division I.**

This result is almost entirely owing to your *really remarkable system*, of which it is impossible to speak too highly. The questions set were so like those we had been answering, one could almost imagine you had been *behind the scenes*. I shall not fail to recommend your Classes to all my friends.—Yours very sincerely,
CLARA DUNSTAN.

---

29 Lothian Road, Anfield,
Dear Sir, November 1, 1899.

Result of **Certificate Exam.** to hand. **Part I., "First;" Part II., "First."** Many thanks for valuable tuition.—Yours very sincerely,
H. GLOVER.

Brambly Lodge, Basingstoke,
Dear Mr. Clough, November 1, 1899.

You will be glad to hear that the Department has placed me in **Division I. in both Parts.** I attribute this rise from two "Thirds" of the First Year to a thoroughly consistent working of your systematic and valuable Course.—I am, dear Sir, yours truly,
TOM PHILLIPS.

Crow Garth, Gainsboro',
Dear Sir, 1-11-99.

I am very pleased to be able to tell you that I have obtained a "**First Class**" **in both Parts** of the Second Year Certificate Examination. I feel that I owe my success greatly to your kind help during the past year. In several of the Papers there were questions almost exactly the same as you had given us. I shall always be pleased to recommend your Classes to any of my friends. Again thanking you, believe me, yours very sincerely,
AGNES HYDE.

Aspull, Wigan,
Dear Mr. Clough, November 2, 1899.

I have heard the result of my Examination, and am pleased to let you know that I have been successful in obtaining a place in the **First Division.** I am sure I owe my success to the valuable help derived from your notes and hints on the different subjects, and I shall have no hesitation whatever in recommending your Classes to my friends.—Yours truly,
EMMA ECKERSLEY.

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3 Paragon Place, Berrylands Road, Surbiton,
Dear Mr. Clough, November 1, 1899.

I am so pleased to tell you that I have been placed in the **First Division in both Parts** in my Second Year Certificate Exam.

I cannot express in words how grateful I am for your help, for I have had no other assistance but from your Classes.

Again thanking you with all my heart, I remain, yours sincerely,
ALICE E. HARDWICK.

Belvoir Road, Coalville,
Dear Sir, November 1, 1899.

Having heard this morning that I have obtained a "**First**" **in each Part**, I write to thank you for the valuable help I received from your Correspondence Classes. I feel convinced that my success is due to your excellent system of teaching. I shall do my best to recommend your Classes to fellow-teachers. Again thanking you, I am, yours sincerely,
MAUD NEALE.

---

6 Skerne Road, Driffield,
Dear Mr. Clough, November 1, 1899.

Result of Exam. to hand this morning. You will be pleased to hear that I am placed in the **First Division in both Parts.** (Second Year Men.)

Although I am not going to give you all the credit for this eminently satisfactory result—as part of it I must reserve for myself—yet I can confidently say that if I had not placed myself in your hands, I should not have done nearly so well. Your system of tuition is really splendid.—I beg to remain, yours faithfully,
W. BISHOP.

---

8 Riley Street, Burslem,
Dear Sir, November 2, 1899.

I have just received the result of the First Year Certificate Examination, and am happy to say that I was successful, being classed in the **First Division in both Parts**, with credit in Arithmetic.

I wish to thank you most sincerely for the valuable aid which I received from your Classes, to which I greatly owe my success, and I shall always be pleased to recommend them to any of my friends.—I am, yours truly,
FLORENCE HURST.

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25 Meir Road, Normacot, Longton,
Dear Sir, November 2, 1899.

Please accept my thanks for helping me to secure a **First Class in both Parts** of the First Year Certificate Examination, 1899.—Yours faithfully,
A. LEACH.

Acomb, Hexham,
Dear Sir, November 2, 1899.

I am glad to be able to inform you that I have been classed in **Division I., Part I.,** and **Division I.** in **Part II.,** of the Certificate Examination.—Sincerely yours,
KATHERINE M. MINTON.

Stallard Street, Trowbridge,
Dear Sir, November 3, 1899.

I have much pleasure in informing you that I have been placed in the **First Division in both Parts** of the First Year Exam., and have obtained credit in Arithmetic.

Thanking you for your able tuition, I remain, yours sincerely,
FLORENCE SHRIMPTON.

Queen Street, Milton,
Dear Mr. Clough, November 2, 1899.

The Certificate result (First Year) came this morning, and I am pleased to inform you that I have obtained a "**First**" **in both Parts** of the Syllabus, with credit in Arithmetic. Thanking you for the help received from your Correspondence Class, I am, yours truly,
ADA B. WAYE.

Cliff Cottage, Turnchapel,
Dear Mr. Clough, November 2, 1899.

I have just heard **result of Certificate Exam.**, and find I have obtained a "**First**" **in both Parts,** with credit in Arithmetic. This result is greatly due to the excellent tuition I have received under your Correspondence Class.—Yours truly,
SARAH GRANGER.

---

12 Oak Bank, Harpurhey, Manchester,
Dear Mr. Clough, November 2, 1899.

I have just received the result of the Examination for First Year Certificate held July last, and am pleased to inform you that I have obtained a "**First Class**" **in both Part I. and Part II.,** and have also received the Credit Mark in Arithmetic. I feel that this result is largely due to your excellent system of tuition. Thanking you very sincerely for your help, I am, yours faithfully,
JENNIE TRODDEN.

---

33 Russell Street, Heaviley, Stockport,
Dear Sir, November 2, 1899.

I have received notice this morning of the result of the First Year Certificate Examination, "**First**" **in Part I. and** "**First**" **in Part II.,** with credit in Arithmetic. Thanking you for your careful tuition, and wishing your Classes every success, I remain, yours truly,
MARTHA WEBSTER.

---

57 Tracey Street, Plymouth,
Dear Mr. Clough, November 2, 1899.

I have just received the result of my First Year Certificate Examination, and I am delighted to tell you I have obtained a "**Double First,**" and passed with credit in Arithmetic. This success I attribute very largely to your splendid Notes, as I only obtained a Third Class in Scholarship. Thanking you very heartily for your valuable assistance, I remain, Sir, yours faithfully,
ETHEL HORRELL.

---

26 Whitefriars Road, Hastings,
Dear Mr. Clough, November 2, 1899.

I am glad to be able to inform you of my success at the recent Certificate Examination, having obtained a position in the **First Division in Parts I. and II.,** and also special credit in Arithmetic. Having proved the excellence of your tuition, both for the Queen's Scholarship and at the Certificate Exam., I can highly recommend my fellow-teachers, sitting for the Exam., to join your Classes.—I remain, yours truly,
RUTH CROWHURST.

Pay Office, Raglan Barracks, Devonport,
Dear Mr. Clough, November 4, 1899.

I am very glad to be able to tell you that I have obtained a **First in both Divisions** of the recent Certificate Exam. I attribute my success entirely to your splendid notes, which do not allow of anything of importance being overlooked.—Yours thankfully,
ETHEL FERGUSON.

Please note that the above are from Correspondence Students only.

P.T. CLASSES for April 1900, and ***October 1900,*** are now at work. Names should be entered without delay.

Next QUARTERLY EXAMINATION, January 20, 1900. Syllabus and full particulars free by return of post.

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OUR FRENCH AND GERMAN PRIZE COMPETITION.

Prize Editor—W. T. THOMPSON, B.A. (LOND.), *French and German Honours.*

RULES.

1. All translations should be posted not later than December 8, and addressed:—*Prize Editor*, Office of THE PRACTICAL TEACHER, 33 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.
4. No competitor may take the prize offered more than once in three months.

FRENCH PRIZE COMPETITION.

A Prize of One Guinea will be given for the best translation into English of the following extract:—

— Es-tu singulier? Tu n'as pas les idées de tout le monde!

— Je m'en flatte!

— C'est bien dangereux, va, de se séparer des autres. Tous les isolés sont malheureux. Il n'y a de force, de sécurité et de satisfaction que dans la communauté. On a besoin de son voisin, on doit le ménager, pour qu'il vous ménage. Il n'est pas bon de s'enfermer dans une tour, et d'y vivre avec des pensées de révolte. La solitude est mauvaise conseillère. Elle conduit au pessimisme, et le pessimisme c'est la stérilité.

— Je ne suis pas pessimiste, ma mère, dit doucement Hiénard. Je crois au bien, je crois à l'amitié, je crois à la reconnaissance. Mais je ne cherche pas le bien là où il ne peut être. Je ne demande pas aux indifférents de m'aimer. Je ne me crois pas des droits sur le cœur des gens parce que je leur aurai donné à dîner. Je déteste la frivolité et le laisser aller du monde. Je me défie de ses perfidies et de ses mensonges, sa stupidité m'écœure. Je trouve que j'ai tout à perdre et rien à gagner, en le fréquentant. Voilà pourquoi, comme vous le dites, je m'enferme dans une tour. Mais il y a une porte à ma tour, et des fenêtres, on y entre et on en sort. La preuve c'est que je suis en ce moment à Deauville, en voiture avec vous, au bord de la mer et en face du plus beau soleil couchant qui se puisse rêver. Admirez ce soleil couchant, ma mère; voilà qui ne trompe pas: ce n'est pas artificiel.

GEORGES OHNET.

RESULT OF THE NOVEMBER COMPETITIONS.

French.

The prize is awarded to "Paul Deschanel," the pseudonym of Miss R. F. Forbes, The Cedars, Herne Hill, S.E.

First Class.—Cæsar, Spes, Dr. Dee, Polly, Tiers Etat, Ashdown, Chemineau, Consuelo, Amanuensis, Lunette, Robin Hood, Lynher, Echo, Gecko, Kettering, W.J.D., Fitzthomas, E.A.K., Cygnet, Oxon, Anastasia, Isobel, Hygelac, Nortoniensis, Atlantis, May, Vera, Catherine Merton, Agaznog, Richmond, Ausdauer, Scallywag, Gonse, Madge, Isabel, Jess, Gutiger, Allez, Automobile, Professeur, Penstrowedd, Braxet, Carpe diem, Sea, Marie Antoinette, L., Quercus, Cerdic, Mutual Attraction, Violet, Victor, Jeannie Deans, Festiniog, S.M.R., Trilby, H.W., Viva, Forward, Sic, Integer.

Second Class.—Brouillard, Kythé, Rockwell, W.M.E., Homewell, Cambrian, Duplex, Guernsey, Louisiana, Kingston, François de S., Hope, Katharine, Glen Ogle, The A.M.B., Hunter, Kaffir, Des Roches, Toynbee, Shamrock, Cheltenham, Sir Nigel, Amos, Gipsy, Caledonia, D.M.N., Imprimatur, Berthe, Mephie, Pythagoras, X.Y.Z., Marie, Trinculo.

Third Class.—Langton, Georgia, Saxifrage, Flora, Shamrock (Prestonkirk), Leighton, Feefee, West.

French Prize Translation.

The initiation of Amdarras was going on. He attended conscientiously all the meetings of the Chamber. The new deputy spent his afternoons strolling about the corridors. As he gradually got in touch with his colleagues, he found reason to modify in more than one respect his ready-made estimate of them. Entering the Palais-Bourbon with the usual prejudices of those accustomed to sweeping denunciations of all its members, Jacques thought that, save for a few exceptions, he would be always coming into contact with the ignorant and useless puppets which every day's newspapers held up to scorn. It was a real surprise to him to find that the conversations, entered upon during chance meetings in the passages, should be of deep interest and even of great service. Such and such a colleague, of no particular repute, whom he had misjudged on account of his opinions or his votes, charmed him in private intercourse by the extent of his information, the moderation and the fairness of his views. From one he gained instruction on some special point in which his companion's full knowledge taught him the measure of his own ignorance; with another he enjoyed the friendly exchange of opinion on general matters. Not a day passed without his finding out little-known legislators who impressed him by their learning or their wide experience, and won his heart by the geniality of their manner or the graces of their mind. Sensitive to every sort of superiority, and prone to self-distrust, Jacques began to wonder uneasily if he was not likely to make a sorry figure among so many men of undeniable power. Still more did he wonder how to reconcile these daily discoveries with that other too evident fact—the wretchedly incompetent administration of the public interests by this body of individually able men.

PAUL DESCHANEL.

German.

The prize is awarded to "Oxon," the pseudonym of H. C. A. Carpenter, Luceus (Vaud), Switzerland.

First Class.—Lynher, Veritas, Consuelo, Cæsar, Agaznog, Lunette.

German Prize Translation.

GRUSS ZUM SCHWEIZERISCHEN LEHRERTAG IN BERN,

8–10 Oktober 1899.

From the snow-clad summits goes forth an enlightening mission
Into the distant lowlands stretching their broad expanses
Beneath heaven's blue dome, and warmed by the autumn sunshine;
Likewise the well-known summons I hear from the mountains sounding—
Sounding as it used to sound in the days of our noble grandsires,
When the land had need of her sons to do for her deeds of greatness.

You, ye leaders of youth, does the sacred salute admonish.
Do ye not hear the sound like the mighty rustling of pinions,
When the royal young of the eagle towers towards the sunlight?
Peace must be changed to-day for the strife and struggle of battle,
Where nation and youth will fight. A destiny hovers above us.
Courage, let us to Bern, and let each show him a warrior.

Soon will the lofty edifice be in that town completed;
Far in the land will shine with splendour the stately pinnacles.
Hosts of heroes will look with watchful eye from out them,
Feeling perchance the beginning of a period of baleful fortune,
Seeking to ward from the land, the belovèd land of their birthplace,
War with its horrors and want.

Suddenly calling, we ask them:
"Union, is it your will to have a nation that acteth
Great in the time of misfortune? Espouse then the cause of the young men;
See that they walk in paths famous for light and for wisdom!"
Teachers, then to your plan prove that you're stanch and true men.
In a materialistic age, uphold the banner of ideal!

OXON.

Report.

A fairly large number of good papers in French was sent in; but many students depend too much on dictionary meanings of words. In fact, they translate rather word by word than sentence by sentence. A rather large number went wrong over the words *fréquenter*, *imposaient*, and *défiant*, which they translated by the English words nearest them in form.

The German extract was an experiment. Although it has, unfortunately, reduced the number of competitors, we do not regret making it. No poetical piece in German has yet been set, and the prose pieces set hitherto have been of a very easy character. A poetical piece like the one we have set is necessarily more vague and abstract than a prose piece; but, on the other hand, it lends itself to greater freedom of translation. It is not quite clear what *in der grauen Zeit* means. It possesses, I think, rather more sound than sense. Every competitor has, I believe, translated it in a different manner. The successful competitor has made a translation in hexameters, but received no extra credit for putting his version into metrical form.

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Fertilis.—AB is the base of a segment of a circle. If any point P be taken on the circumference, and AP produced to Q, so that the angle PBQ is equal to a given angle, show that Q lies on a segment of another circle, on the same base.

Draw the figure. Remember that "AB produced to Q" means "AB produced (*in the direction from A to B*) to Q."

By III. 21, the angle APB is constant for all positions of P on the circumference.

The angle APB is equal to the sum of angles PBQ, PQB, by I. 32. But the angle PQP is constant, being equal to a given angle.

Therefore the angle AQB is constant, and Q must lie on the segment of a circle of which AB is the base.

J. W. Wilkinson.—Prove—

1. $a_1 + a_2 + a_3 + a_4 > 4\sqrt[4]{a_1a_2a_3a_4}$.
2. $(a_1 + a_2 + a^3 + \ldots + a_n)^2 < n\,(a_1^2 + a_2^2 + \ldots + a_n^2)$.

1. The square of every real quantity is positive, and therefore greater than zero.

$(x - y)^2$ is positive, $\therefore x^2 - 2xy + y^2 > 0$.

$\therefore x^2 + y^2 > 2xy$, and $l + m > 2\sqrt{lm}$ . . . . (I.).

Hence $a_1 + a_2 > 2\sqrt{a_1a_2}$, and $a_3 + a_4 > 2\sqrt{a_3a_4}$.

$\therefore a_1 + a_2 + a_3 + a_4 > 2(\sqrt{a_1a_2} + \sqrt{a_3a_4})$.

But by (I.) $\sqrt{a_1a_2} + \sqrt{a_3a_4} > 2\sqrt{\sqrt{a_1a_2a_3a_4}}$.

$\therefore a_1 + a_2 + a_3 + a_4 > 4\sqrt[4]{a_1a_2a_3a_4}$.

2. Since $x^2 + y^2 > 2xy$, $\dfrac{x^2 + y^2}{2} > xy$,

$$\frac{x^2 + y^2}{2} + \frac{x^2 + y^2}{2} > xy + \frac{x^2 + y^2}{2},$$

$$\therefore \quad x^2 + y^2 > \frac{(x + y)^2}{2}, \quad \therefore x^2 + y^2 > 2\left(\frac{x + y}{2}\right)^2. \text{ (II.).}$$

Consider the expression $a_1^2 + a_2^2 + a_3^2 + \ldots + a_n^2$, and suppose that a_1 and a_2 are unequal. If we replace a_1 and a_2 by the two equal quantities $\dfrac{a_1 + a_2}{2}$, $\dfrac{a_1 + a_2}{2}$, the value of $a_1 + a_2 + a_3 + \ldots + a_n$ remains unaltered; but the value of $a_1^2 + a_2^2 + a_3^2 + \ldots + a_n^2$ is diminished, because (Eq. II.) $a_1^2 + a_2^2 > 2\left(\dfrac{a_1 + a_2}{2}\right)^2$.

Hence, so long as any two of the quantities a_1, a_2, a_3 are unequal, the expression $a_1^2 + a_2^2 + \ldots + a_n^2$ can be diminished without altering the value of $a_1 + a_2 + \ldots + a_n$; the value of $a_1^2 + a_2^2 + \ldots + a_n^2$ *will therefore be least* when all the quantities $a_1, a_2 \ldots$ are equal. *In this case* each of the quantities is equal to $\dfrac{a_1 + a_2 + \ldots + a_n}{n}$, and the value of $a_1^2 + a_2^2 + \ldots + a_n^2$ then becomes

$$n\left(\frac{a_1 + a_2 + \ldots + a_n}{n}\right)^2.$$

Hence, when a_1, a_2, a_3 are *unequal*,

$$a_1^2 + a_2^2 + \ldots + a_n^2 > n\left(\frac{a_1 + a_2 + \ldots + a_n}{n}\right)^2.$$

$$\therefore (a_1 + a_2 + \ldots + a_n)^2 < n\,(a_1^2 + a_2^2 + \ldots + a_n^2).$$

Bike.—Prove that

$$\int_{-\infty}^{+\infty} \frac{dx}{(x^2 \pm ax + a^2)(x^2 \pm bx + b^2)} = \frac{2\pi}{\sqrt{3}} \cdot \frac{a + b}{ab(a^2 + ab + b^2)}.$$

Edwards' *Integral Calculus.*

We first require to split the given expression into partial fractions. Let

$$\frac{1}{(x^2 + ax + a^2)(x^2 + bx + b^2)} = \frac{Ax + B}{x^2 + ax + b^2} + \frac{Dx + E}{x^2 + bx + b^2},$$

where A, B, D, and E are at present unknown quantities, which we at once proceed to determine. Reducing to a common denominator,

$$\frac{1}{(x^2 + ax + a^2)(x^2 + bx + b^2)} = \frac{(A + D)x^3 + (B + E + Ab + Da)x^2 + (Ab^2 + Da^2 + Bb + Ea)x + Bb^2 + Ea^2}{(x^2 + ax + a^2)(x^2 + bx + b^2)}.$$

This is an identity—that is, true for all values of x. Hence we must have

$$A + D = 0. \quad . \quad . \quad . \quad . \quad . \quad (1).$$
$$B + E + Ab + Da = 0. \quad . \quad . \quad . \quad . \quad . \quad (2).$$
$$Ab^2 + Da^2 + Bb + Ea = 0. \quad . \quad . \quad . \quad . \quad . \quad (3).$$
$$Bb^2 + Ea^2 = 1. \quad . \quad . \quad . \quad . \quad . \quad (4).$$

From (1), $D = -A$; substituting this in (2) and (3), we get

$$B + E + A(b - a) = 0 \quad . \quad . \quad . \quad . \quad . \quad (5),$$
$$\text{and } A(b^2 - a^2) + Bb + Ea = 0. \quad . \quad . \quad . \quad . \quad . \quad (6).$$

From (5), $A = -\dfrac{B + E}{b - a}$; substituting this in (6), we get $-(B + E)(b + a) + Bb + Ea = 0$, which reduces to

$$Eb + Ba = 0. \quad . \quad . \quad . \quad . \quad . \quad . \quad (7).$$

From (7) and (4) we find that $B = \dfrac{-b}{a^3 - b^3}$, and $E = \dfrac{a}{a^3 - b^3}$.

Substituting these values in (5), we find that $A = \dfrac{1}{a^3 - b^3}$, and $\therefore D = \dfrac{-1}{a^3 - b^3}$.

Giving A, B, D, E their proper values as just determined, we get

$$\frac{1}{(x^2 + ax + a^2)(x^2 + bx + b^2)} = \frac{1}{a^3 - b^3}\left(\frac{x - b}{x^2 + ax + a^2} - \frac{x - a}{x^2 + bx + b^2}\right).$$

Hence

$$\int \frac{dx}{(x^2 + ax + a^2)(x^2 + bx + b^2)} = \frac{1}{a^3 - b^3}\int \frac{x - b}{x^2 + ax + a^2}\,.\,dx - \frac{1}{a^3 - b^2}\int \frac{x - a}{x^2 + bx + b^2}\,.\,dx.$$

Now

$$\int \frac{x - b}{x^2 + ax + a^2}\,.\,dx = \int\left(\frac{1}{2}\,\frac{2x + a}{x^2 + ax + a^2} - \frac{b + \frac{a}{2}}{x^2 + ax + a^2}\right).dx$$
$$= \frac{1}{2}\log(x^2 + ax + a^2) - \frac{2b + a}{\sqrt{3a}}\tan^{-1}\frac{2x + a}{\sqrt{3a}}.$$

Similarly

$$\int \frac{x - a}{x^2 + bx + b^2}\,.\,dx = \frac{1}{2}\log(x^2 + bx + b^2) + \frac{2a + b}{\sqrt{3b}}\tan^{-1}\frac{2x + b}{\sqrt{3b}}.$$

We thus get

$$\int_{-\infty}^{\infty} \frac{dx}{(x^2 + ax + a^2)(x^2 + bx + b^2)}$$
$$= \frac{1}{a^3 - b^3}\left[\frac{1}{2}\log(x^2 + ax + a^2) - \frac{2b + a}{\sqrt{3a}}\tan^{-1}\frac{2x + a}{\sqrt{3a}} - \frac{1}{2}\log(x^2 + bx + b^2) + \frac{2a + b}{\sqrt{3b}}\tan^{-1}\frac{2x + b}{\sqrt{3b}}\right]_{-\infty}^{+\infty}$$
$$= \frac{1}{a^3 - b^3}\left[\frac{1}{2}\log\frac{x^2 + ax + a^2}{x^2 + bx + b^2} - \frac{2b + a}{\sqrt{3a}}\tan^{-1}\frac{2x + a}{\sqrt{3a}} + \frac{2a + b}{\sqrt{3b}}\tan^{-1}\frac{2x + b}{\sqrt{3b}}\right]_{-\infty}^{+\infty}.$$

When x is $+\infty$, $\dfrac{x^2 + ax + a^2}{x^2 + bx + b^2} = \dfrac{1 + \frac{a}{x} + \frac{a^2}{x^2}}{1 + \frac{b}{x} + \frac{b^2}{x^2}} = 1$,

$\tan^{-1}\dfrac{2x + a}{\sqrt{3a}} = \dfrac{\pi}{2}$, and $\tan^{-1}\dfrac{2x + b}{\sqrt{3b}} = \tan^{-1}\infty = \dfrac{\pi}{2}$.

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$=\tan^{-1}(-\infty)=-\dfrac{\pi}{2}$, and $\tan^{-1}\dfrac{2x+b}{\sqrt{3}b}=-\dfrac{\pi}{2}$.

Hence the integral becomes

$$\frac{1}{a^3-b^3}\left[\frac{1}{2}(1)-\frac{2b+a}{\sqrt{3}a}\frac{\pi}{2}+\frac{2a+b}{\sqrt{3}b}\frac{\pi}{2}\right]$$

$$-\frac{1}{a^3-b^3}\left[\frac{1}{2}(1)-\frac{2b+a}{\sqrt{3}a}\left(-\frac{\pi}{2}\right)+\frac{2a+b}{\sqrt{3}b}\left(-\frac{\pi}{2}\right)\right]$$

$$=\frac{1}{a^3-b^3}\left[-\frac{2b+a}{\sqrt{3}a}\pi+\frac{2a+b}{\sqrt{3}b}\pi\right]=\frac{\pi}{\sqrt{3}(a^3-b^3)}\left[\frac{2(a^2-b^2)}{ab}\right]$$

$$=\frac{2\pi(a-b)(a+b)}{\sqrt{3}(a-b)(a^2+ab+b^2)}=\frac{2\pi}{\sqrt{3}}\frac{a+b}{ab(a^2+ab+b^2)}.$$ Ans.

The integral

$$\int_{x=-\infty}^{x=\infty}\frac{dx}{(x^2-ax+a^2)(x^2-bx+a^2)}$$

$$=-\int_{x=-\infty}^{x=\infty}\frac{d(-x)}{[(-x)^2+a(-x)+a^2][(-x)^2+b(-x)+b^2]}$$

$$=\int_{-x=-\infty}^{-x=\infty}\frac{d(-x)}{[(-x)^2+a(-x)+a^2][(-x)^2+b(-x)+b^2]}$$

$$=\int_{-\infty}^{\infty}\frac{dy}{(y^2+ay+a^2)(y^2+by+b^2)},\text{ if } y=-x.$$

This gives exactly the same result as before.

M.—Explain the following cutting from the money column of a newspaper:—Amongst Foreign Rails., Mexican Rails. were strong, the Ordinary rose $\frac{1}{4}$, First Preferred 2, and Second Preferred 1; Canadian Pacifics fell $\frac{3}{4}$ to $48\frac{3}{4}$.

The terms, Foreign Rails., Mexican Rails., and Canadian Pacifics are abbreviations for Foreign Railway Company's shares, Mexican Railway Company's shares, etc.

A company may issue shares of different kinds—*Debentures*, bearing a fixed rate of interest, and offering a certain security for the return of the principal at some future time; *Preference Shares*, bearing a fixed rate of interest; *Ordinary Shares*, the interest on which is paid with what remains after the interest on the Debentures and Preference shares has been paid. (See *Christian and Collar.*)

For instance, the Mexican Railway Company's stock is divided as follows—£2,254,720 in *Ordinary* shares; £2,554,100 in *First Preferred* shares, bearing interest at 8% per annum; £1,011,900 in *Second Preferred* shares, bearing interest at 6% per annum; £2,000,000 *Perpetual Debentures* at 6%; all shares issued of a nominal value of £100.

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The term "Mexican Rails. were strong," means that on the particular day referred to a good many inquiries were made for Mexican Railway Company's shares—that is, a good business was done in those shares; there were a good many buyers. The *Ordinary* shares during that day are selling 10s. higher than on the previous day; the *First Preferred* £2 higher, and the *Second Preferred* £1 higher.

The *Canadian Pacific Railway Company's* shares, which were selling at £49$\frac{1}{2}$ the day before, have fallen to £48$\frac{3}{4}$ each.

No information is given in the cutting as to the original value of the shares, the total amount of stock, or the rate of interest or dividend paid; an intending buyer can obtain this from various sources.

Timothy.—If A, B, C be the angles of a triangle, prove that $4\sin A\sin B\sin C=\sin(-A+B+C)+\sin(A-B+C)+\sin(A+B-C)$. (H. Smith's *Trigonometry.*)

$A+B+C=180°$; $(-A+B+C)=A+B+C-2A=180°-2A$.

$\sin(-A+B+C)=\sin(180°-2A)=\sin 2A$.

Similarly, $\sin(A-B+C)=\sin 2B$, and $\sin(A+B-C)=\sin 2C$.

Hence $\sin(-A+B+C)+\sin(A-B+C)+\sin(A+B-C)$

$=\sin 2A+\sin 2B+\sin 2C$

$=2\sin(A+B)\cos(A-B)+\sin 2C$,

$=2\sin C\cos(A-B)+2\sin C\cos C$,

since $\sin(A+B)=\sin(180°-C)=\sin C$

$=2\sin C[\cos(A-B)+\cos C]$

$=2\sin C[\cos(A-B)-\cos(A+B)]$, since $\cos C=\cos 180°-(A+B)=-\cos(A+B)$

$=2\sin C[2\sin A\sin B]$

$=4\sin A\sin B\sin C$.

Oxonian.—When a leak was discovered in a vessel, the water had only to rise 6 feet to sink her. For the first 8 minutes 12 men of the 18 on board worked at the pumps, and the water rose 3 feet. Then 14 worked for 6 minutes, and the water rose 2 feet. Then the 18 men worked till she sank. Find the time between when the leak was discovered and when she sank. (Civil Service.)

Find—

1. What fall per minute per man could be produced if *no* water were leaking into the vessel. Call this F.

2. What rise per minute is due to leak alone—that is, pumps not working. Call this R.

From the first statement, in 1 minute, 12 men working, rise is $\frac{3}{8}$ foot.

From the second statement, in 1 minute, 14 men working, rise is $\frac{1}{3}$ foot.

$\therefore$ In 1 minute, $R-12F=\frac{3}{8}$ foot,

and $R-14F=\frac{1}{3}$ foot.

Hence $2F=\frac{3}{8}-\frac{1}{3}=\frac{1}{24}$ foot.

$F=\frac{1}{48}$ foot per minute per man.

In 1 minute the 12 men could produce a fall of $\frac{1}{48}\cdot 12=\frac{1}{4}$ foot if there were no leak. But the actual rise per minute, with 12 men working, is $\frac{3}{8}$ foot. Hence the rise per minute (R) due to leak must be $\frac{1}{4}+\frac{3}{8}=\frac{5}{8}$ foot.

We are now able to find the actual rise per minute when 18 men are working.

It will be $\frac{5}{8}-\frac{1}{48}\cdot 18=\frac{1}{4}$ foot per minute.

Hence the level will rise 1 foot in 4 minutes.

Total time from start $=8+6+4=$ 18 minutes. Ans.

T.A.I.—D is the middle point of the hypotenuse AB of a right-angled triangle ABC: draw CE at right angles to AB; show that DE tan 2A = AE tan A; and hence find geometrically tan 2A in terms of tan A.

If $\cos\beta\tan x=\sin\alpha$, show that

$\cos(\alpha-\beta)\cos(\alpha+\beta)\tan 2x=\sin(\alpha-\beta)+\sin(\alpha+\beta)$.

(S. and A., Stage III., 1899.)

Draw the figure, taking A less than B.

Since DC = DA, the angles DAC, DCA are equal; the exterior angle BDC is equal to the two interior angles DAC, DCA. Therefore angle BDC = 2A.

$$DE\tan 2A=DE\frac{CE}{DE}=CE=AE\tan A.$$

$$\tan 2A=\frac{AE\tan A}{DE}=\frac{AE\tan A}{DB-EB}$$

$$=\frac{AE\tan A}{\frac{1}{2}AB-EB}=\frac{AE\tan A}{\frac{1}{2}(AB-EB)-\frac{1}{2}EB}$$

$$=\frac{AE\tan A}{\frac{1}{2}(AE-EB)}=\frac{2AE\tan A}{AE-CE\tan A}$$

(because angle BCE = A)

$$=\frac{2AE\tan A}{AE-(AE\tan A)\tan A}=\frac{2\tan A}{1-\tan^2 A}.$$ Ans.

If A be greater than B, the proof is obtained in the same way; but remember that tan 2A is now *negative*.

$$\cos(\alpha-\beta)\cos(\alpha+\beta)\tan 2x=\tfrac{1}{2}(\cos 2\alpha+\cos 2\beta)\frac{2\tan x}{1-\tan^2 x}$$

$$=\tfrac{1}{2}(1-2\sin^2\alpha+2\cos^2\beta-1)\frac{2\left(\frac{\sin\alpha}{\cos\beta}\right)}{1\quad\frac{\sin^2\alpha}{\cos^2\beta}}$$

$$=(\cos^2\beta-\sin^2\alpha)\frac{2\sin\alpha\cos\beta}{(\cos^2\beta-\sin^2\alpha)}$$

$$=2\sin\alpha\cos\beta=\sin(\alpha-\beta)+\sin(\alpha+\beta).$$

W.M.—Solution by post.

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THE sixtieth and last report of the Committee of Council on Education presents the opportunity for a contemplation of the great work achieved for popular education during the reign of Her Majesty Queen Victoria. The report, however, is not wholly retrospective, but deals with things as they at present exist, and anticipates further improvements in time to come.

A comparison of the Blue Book on Education for 1839 with the one for 1899 would show such a record of progress as no other sixty years could emulate. The interval between the issue of these two has witnessed the growth of national aid to schools from £20,000 to £4,554,932. At the institution of the Committee of Privy Council, the education of the poorer classes was in the hands—so far as there was any education at all—of the religious denominations, and the first grants were simply so much subscriptions to the National Society and the British and Foreign School Society. The foundations of the dual system, represented by the voluntary and Board Schools to-day, had been laid by Bell and Lancaster some thirty years previously, and in the interval "much had been done by private and corporate effort, and to a small extent by the Government, towards supplying part of, the then urgent need for elementary education." But the destitution of some districts was greater than private benevolence could cope with or public safety allow; hence the supplemental work of the Department, and the stimulus, organised inspection, and systematic assistance rendered by the state since that time.

The last sixty years have seen, therefore, the growth of the system as it at present exists. They have witnessed the evolution of the certificated trained teacher, and the introduction of the pupil-teacher system, which still forms the chief source of supply for teachers in elementary schools. The training colleges for teachers are also a product of the period; while codes, instructions to inspectors, inspectors themselves, School Boards, Board Schools, school attendance committees, compulsory attendance, free education, help from the rates, and commissions on education have all had their inception during the time. There have been five permanent secretaries of the Department, acting under the instructions, or guiding the deliberations, of sixteen vice-presidents of the Council. The first of the permanent secretaries was Mr. Kay-Shuttleworth, whose policy may be best described by reference to that of Sir George Kekewich, the last of the secretaries—a broad and liberal education for the teacher, and a perfect trust in his willingness and ability to educate. A gradual lowering of the ideal, and an introduction of the commercial spirit into education, followed by a lessening of the requirements, a distrust of the teacher, and the loss of freedom, variety, and elasticity in the rule of the schools characterised the Government between the first and the last. To Robert Lowe, among the vice-presidents, we owe the Revised Code; to Forster, the Education Act of 1870; to Lord Sandon, the Act of 1876; to Mundella, the increase of the subjects in the curriculum; to Hart Dyke, free education; to Acland, the liberalising of the evening schools; to Gorst, increased aid to voluntary schools. With Sir John Gorst will disappear the vice-president of the Council, and with the introduction of the Board of Education will come a president, often, if not always, with Cabinet rank, and with a power which no former ruler ever exercised.

The last report reminds us that during the year three Acts of Parliament, calculated to materially promote the welfare of national education, have been passed—namely, the Board of Education Act, the Elementary Education (School Attendance 1893) Amendment Act, and the Elementary Education (Defective and Epileptic Children) Act—and briefly narrates their chief provisions. The first has already been fully analysed in THE PRACTICAL TEACHER; the second raises the age of half-time exemption for children working in factories to twelve instead of eleven; and the last enables school authorities to make educational provision for the class of children named, to the age of sixteen. The Superannuation Act for Teachers comes in for its share of commendation, with the expression of a hope that it "may do much to abate the anxieties, and to relieve the needs, of those who render the nation long and devoted service as teachers in public elementary schools."

The accommodation provided for children is now 6,345,906. There are 5,601,249 on the registers, and the average attendance is 4,554,165, or 81·66 per cent. If the attendance of older children and infants be calculated separately, the former is 87·79, and that of the infants 70·79. Of these children, 4,870,615 receive their education free, while 706,251 still pay fees. The number of free schools is 17,008, and continues to increase. There are now only 95 schools which refuse the fee grant. The Exchequer help to the education of these scholars amounted to £4,554,932 in annual grants, and £2,265,319 in fee grants during the past year for day schools, and to £188,763 for evening schools.

To provide the accommodation, School Boards have contracted loans to the extent of £37,150,310; and last year, for the maintenance of schools, the payment of interest, the repayment of loans, and for administration, nearly five million pounds were obtained from the rates—£2,384,616 being for maintenance. The annual cost of maintenance of the schools of both types gradually increases. In 1879 it stood at £1, 14s. 6d. per child in voluntary schools, and £2, 2s. 0¾d. in Board Schools. Last year the amounts respectively were £2, 2s. 4¾d. and £2, 13s. 9½d. The help the voluntary schools obtained from subscriptions was at the rate of 6s. 1d. per child, being a decrease of 7½d. per child in average attendance, and amounted in the aggregate to £757,821, against £835,429 in the previous year.

The introduction of the aid grant has led to the formation of 10 associations composed exclusively, and 36 mainly, of church schools, 11 of Roman Catholic schools, 11 of British schools, 6 of Wesleyan, and 1 of Jewish schools. Two hundred and eighteen schools have not joined an association.

It is a matter for sincere regret that the number of scholars above twelve years increases but slowly, the great increase in the numbers in the schools being in the children under seven years of age.

The training colleges can now accommodate 3,629 students, and the day training colleges 956 students. Increases in both kinds are taking place this year. Only 1,832 Queen's Scholars could be admitted to the residential colleges, and 492 to the day colleges, out of 9,392 who passed the examination last year.

Grants are still paid to schools for subjects, the average amount during last year being one pound per child in average attendance. This will be increased in the next report, as drawing is now paid for by the Education Department, and not by the Science and Art Department. The teaching of laundry, cookery, woodwork, military drill, and singing by note all show an increase of numbers. English is rapidly losing its place among class subjects.

The army of teachers steadily increases. There are now 59,874 certificated teachers, 31,038 pupil teachers, 26,736 assistant teachers, and 15,136 Art. 68. These all show increases, except the number of pupil teachers, which shows a decrease of 1,560. Salaries rise slowly; the average of all classes is gradually increasing. It will be of interest to note that four teachers receive between £500 and £600 a year, one between £600 and £700, and one between £800 and £900. The average salary of a master is £124, 4s. 11d., and of a mistress is £83, 1s. 1d. Comparing that of head teachers in 1874 with head teachers in 1898, the increase of the average salary of masters has been 32·7 per cent., and of head mistresses 44·4 per cent.

With this report closes the fragmentary rule of the Committee of Council. It is possible that in the future much that has been evil or prejudicial in the management of education will be removed. The amalgamation of the various bodies superintending educational effort into one Board of Education cannot but tend for good. If it secures for us equal educational opportunities for children of all grades, the correlation of work in all classes of schools, the free passage of poor children from primary to other schools—however much the passing away of a department with which we have had close connection for many years may be regretted—a brighter future for education dawning will amply compensate for that regret.

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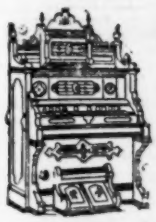

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THE EDITOR'S TABLE

THE PRACTICAL STUDY OF LANGUAGES.*

BY PROFESSOR HENRY SWEET, M.A., LL.D.

THE volume under review is a weighty contribution to the discussion of a subject of very great importance. It is a book which teachers and learners should not only read but study and digest, for it is the fruit of Professor Sweet's own experiences in both capacities. It is easy to see that the professor is an original and bold thinker, who is prepared to carry out to their logical outcome the ideas of which his ripe judgment approves. Many popular notions with regard to the study of languages are treated by the author with scant respect; but if a great deal of the criticism of existing methods is destructive in its character, there is an abundance of suggestions for improving our methods of language teaching. The book is a little dogmatic in tone, but it is the dogmatism of a strong man who feels that he knows what he is writing about.

Our author prefaces his observations on the principles to be followed in studying languages by remarking on the dissatisfaction generally felt with existing methods.

> "This dissatisfaction is strikingly shown by the way in which new 'methods' are run after—especially the more sensational ones, and such as have the good fortune to be taken up by the editor of some popular periodical. But none of these methods retain their popularity long—the interest in them soon dies out. There is a constant succession of them; Ollendorff, Ahn, Prendergast, Gouin, to mention only a few, have all had their day.....A method such as Gouin's, which ignores phonetics, is not a method; at the most, it gives hints for a real method. Gouin's 'series-method' may in itself be a sound principle, but it is too limited in its applications to form even the basis of a fully-developed method."

There is a great deal in this with which all must agree, but we should have liked a little vigorous denunciation of works of a much lower type than those cited by the author, which delude inexperienced people into believing that they can teach themselves to speak foreign languages in an incredibly short time, and without any serious expenditure of effort. Such works as these, although often full of gross blunders, circulate by tens of thousands. On the question of the method to be pursued we will let Professor Sweet speak for himself.

> "A good method must, before all, be comprehensive and eclectic. It must be based on a thorough knowledge of the science of language—phonetics, sound-notation, the grammatical structure of a variety of representative languages, and linguistic problems generally. In utilising this knowledge it must be constantly guided by the psychological laws on which memory and the association of ideas depend."

It will be seen from the above that the author makes phonetics, which he defines as the science of speech-sounds, or practically the art of pronunciation, the basis of his system. The efficient teaching of phonetics is impeded by two popular fallacies. The author's remarks on the more important of these fallacies are well worth quoting.

> "The first of these [fallacies] is that pronunciation can be learned by mere imitation. This is as if fencing could be learned by looking at other people fencing. The movements of the tongue in speaking are even quicker and more complicated than those of the foil in fencing, and are, besides, mostly concealed from sight.....Again, many beginners, in listening to the speech of a native, will often confidently assert that the pronunciation of a certain sound varies from word to word; and when the natives assure them that they are mistaken, they only regard it as a proof of their superior acuteness of hearing: they do not know that it is one of the surest signs of unfamiliarity with the sound in question. The impressions of the ear sway, as it were, from side to side in the vain attempt to identify the unfamiliar sound with some familiar one; and when the sound is thoroughly mastered this fluctuation ceases."

The author strongly urges that languages should be first read and written in a phonetic notation, and subsequently in their ordinary or "nomic" spelling. As a basis for an international phonetic system he advocates making the later Latin pronunciation the foundation, with such modifications and additions as may be necessary. But in advocating the use of phonetic notation he is not arguing for phonetic spelling. The object of using a phonetic notation is to teach the sounds of the new language correctly. When it has done its work, it will make way for the ordinary spelling. But he is fully aware of the objections to the use of two notations for one language.

> "The first and most obvious objection brought against the use of a phonetic notation in teaching a foreign language is the danger of confusion between the phonetic and the nomic spelling of the language. *A priori* theorists have argued that the result of beginning with a phonetic spelling will be 'to spoil the learner's spelling for life.' But all who have ever given the phonetic method a fair trial maintain that this objection has no practical weight."

In defending the contention contained in the last paragraph, the author ventures on an analogy:—

> "The relation between phonetic and nomic spelling is analogous to that between the tonic sol-fa notation and the ordinary staff notation in music.....The result of beginning with the tonic sol-fa notation is that thousands who would be quite unable to learn music from the ordinary notation master it perfectly on the new system, and are then able, with a little practice, to read music at sight from the staff notation, so that even if their sole object is to learn the latter, they save themselves much toil and trouble by beginning with the tonic sol-fa notation."

The analogy does not appear to us to hold, as the symbols used in the staff notation possess a fixed, not an unfixed, value. And while there is only one staff notation, there are, unfortunately, many "nomic" alphabets, the same characters in each alphabet not representing the same sounds.

The suggestion so often made, that the phonograph may be used in studying foreign languages, does not escape the author's criticism.

> "It must be borne in mind that wherever we have access to native speakers the phonograph is superfluous, for it cannot speak better than a native. And where we have to rely entirely on the phonographic record, its testimony is sometimes defective on points where information is most needed: it fails to reproduce shades of breath-sounds and the less sonorous elements of speech."

One of the most suggestive chapters in Professor Sweet's book is that in which he urges that all study of language, whether theoretical or practical, should begin with the spoken language. The whole chapter is brimful of cogent argument. We will endeavour to do justice to it by quoting a few sentences from it.

> "In European languages, where the difference (between the written and the spoken language) is much less, most grammarians tacitly assume that the spoken is a mere corruption of the literary language. But the exact contrary is the case; it is the spoken which is the real source of the literary language.....If we compare the written and spoken language of a given period, we shall find that the literary language is full of superfluous words and phrases, which the spoken language nearly always gets rid of. Thus in the English spoken language, the idea 'sky' is expressed by

* *The Practical Study of Languages: A Guide for Teachers and Learners.* By Henry Sweet, M.A., Ph.D., LL.D., Corresponding Member of the Munich Academy of Sciences, formerly President of the Philological Society. London: J. M. Dent and Co.

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this word only, while in the literary language it may be expressed by *heaven, heavens, firmament, welkin*.....By starting from the spoken language we have less to learn, and we learn it accurately. Everything points to the conclusion that in learning foreign languages we should follow the natural order in which we learn our own language—that is, that we should begin with learning the spoken language thoroughly, and then go on to the literary language."

On psychological grounds the same course is recommended. As our strongest and most direct associations ought to be with the spoken language, it is advisable that this should be first learned.

The author's remarks on the difficulties of language show that he has brought a keen power of analysis to bear on his linguistic studies. The study of languages most nearly allied to our own is, in some respects, facilitated by that very circumstance; but there are compensating difficulties. The author arrives at the conclusion that all languages are equally difficult.

The fundamental objection to such systems as those of Ahn is that language is only partly rational. We do not speak by rule. Such books exclude the really natural and idiomatic combinations, which cannot be formed *à priori*, and produce insipid, colourless combinations, which do not stamp themselves on the memory, and many of which could hardly occur in real life. The abuse of the grammar-cum-dictionary method has led to an advocacy of the "natural method" by which children learn their own language. But, says the author,—

> "These enthusiasts forget that the process of learning one's own native language is carried on under peculiarly favourable circumstances, which cannot be even approximately reproduced in the later study of foreign language..... The fundamental objection, then, to the natural method is that it puts the adult into the position of an infant, which he is no longer capable of utilising, and, at the same time, does not allow him to make use of his own special advantages. These advantages are, as we have seen, the power of analysis and generalisation—in short, the power of using a grammar and dictionary."

Even residence abroad does not present the advantages for picking up a foreign language which are usually ascribed to it. Most good linguists learn nearly everything from books, especially in the beginning of their studies. Professor Sweet's advice to those who wish to derive the fullest benefit from residence abroad is—(1) to prepare oneself thoroughly beforehand; (2) choose a place where a good standard of pronunciation can be heard; and (3) keep up systematic study to the last.

Professor Sweet would exclude, as not being parts of the practical study of languages, derivation of modern from more ancient forms, etymologies and comparisons with cognate languages. As language is only partly rational, only part of it can be brought under general rules. The author's remarks on rules are very sensible:—

> "The usefulness of a rule depends (1) on its extent—that is, the number of examples included under it; (2) on its efficiency—that is, the number of exceptions it has to admit, the rule that has the fewest exceptions being the most efficient; (3) its definiteness, clearness, and simplicity—that is, the ease with which it is learned and applied, independently of its extent and efficiency.....If a rule covers a great many words, it may be worth while learning it, even if there are a good many exceptions. The exceptions must be in the minority to make a rule worth learning.....Thus, as we shall see hereafter, the genders of nouns in such languages as French and German are better learnt one by one than by rule; hence it is not worth while to give any rules for gender in these languages, except those which practically admit of no exception."

We commend these remarks by a man of such standing as our author to any who are likely to be taken in by the misleading and mendacious statements contained in cheap manuals for learning foreign languages easily—the "ease" being obtained by ignoring exceptions and difficulties. The best way of learning genders of nouns in foreign languages is by learning the definite article with the noun (for example, *das haus, la fleur*), and thus creating a mental association of the two.

Syntactical rules, from the nature of the case, admit of fewer exceptions, and hence may be learned with profit.

Consistently with the principle of learning the living and spoken language first, the author would have grammars drawn up to teach first the colloquial form of a language.

Learning lists of isolated words is not synonymous with making progress in a language. The beginner is not concerned with isolated words, but with their combinations into natural sentences. The sentences must be natural, and not, as in the Ollendorffian and similar systems, regarded merely as bags into which may be crammed as much grammatical information as they will hold.

A correct method of learning foreign languages implies that the pyschological principle of association is implied and utilised to the fullest extent. Says Professor Sweet:—

> "The whole process of learning a language is one of forming associations. When we learn our own language, we associate words and sentences with thoughts, ideas, actions, and events."

In applying this principle, the most frequent and necessary elements should be presented first; like and like should be presented (for example, the mutation plurals in English, *men* and *geese*), and then like contrasted with unlike, till all sense of effort in the transition ceases. Thus regular and irregular forms should be contrasted in such natural combinations as *hands and feet, ducks and geese, men and animals*. The associations should be as definite as possible, direct and concrete rather than indirect and abstract, and conflicting associations should be avoided.

Another pyschological principle on which the learning of languages depends is that of interest. On the interest taken in the subject depends the degree of attention given to it, and the amount of attention given determines the hold which the subject studied will have on the memory. But the interest taken must be a real one, and this is where the author believes Gouin to err. His remarks on this subject are too long to transcribe here, and should be carefully read by all who are interested in the subject treated of.

The author's opinions on the utility of grammars are a compromise between the opinions of those who would abolish grammars and of those who still stick to the old grammatical teaching. In the early stages, the amount of grammar given should be only so much as is required for a study of the texts used. The pupil next advances to a study of the grammar of the colloquial language, after which he is ready to study the grammar of the literary language. The study of historical grammar is not a part of the practical study of languages, and should not be taken up until the student has completed his study of the grammar of the literary language.

Accidence and syntax our author would have taught together.

Dr. Sweet says of dictionaries:—

> "For purposes of practical study of modern languages we require dictionaries which are strictly limited to the modern language, and exclude all encyclopædic elements—that is, all words of which it is conceivable that an educated native might say that he had never seen them in literature, or did not know what they meant."

The text studied at first should be short, connected, and in harmony with the language they are intended to teach. Descriptive pieces, in which the verb is chiefly in the present tense and in the third person, would come first, and be followed by novels and short stories, which contain both description, narrative, and dialogue.

In place of exercises and translation into the foreign language, Dr. Sweet recommends free composition on subjects taken from the texts already studied.

The book contains some excellent chapters on conversation, on methods of learning oriental and dead languages, and on original investigation. Exigencies of space do not allow us to do more than mention these. We heartily commend the book to the attention of all our readers who are interested in language study on teaching. It deals with the subject in a most exhaustive manner, and, whether one agrees with Dr. Sweet's conclusions or not, it must be admitted that this book is a most valuable contribution to the discussion of a subject of great national importance.

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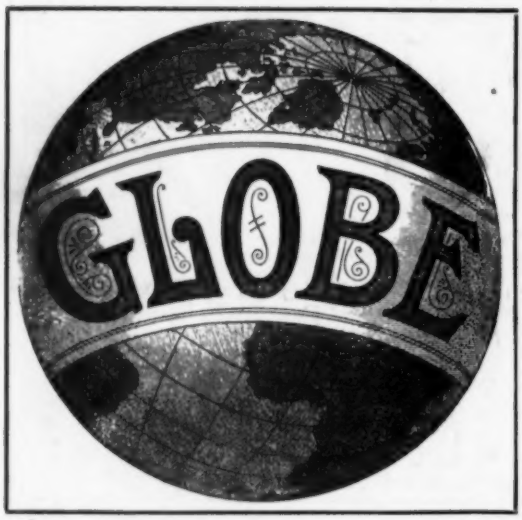

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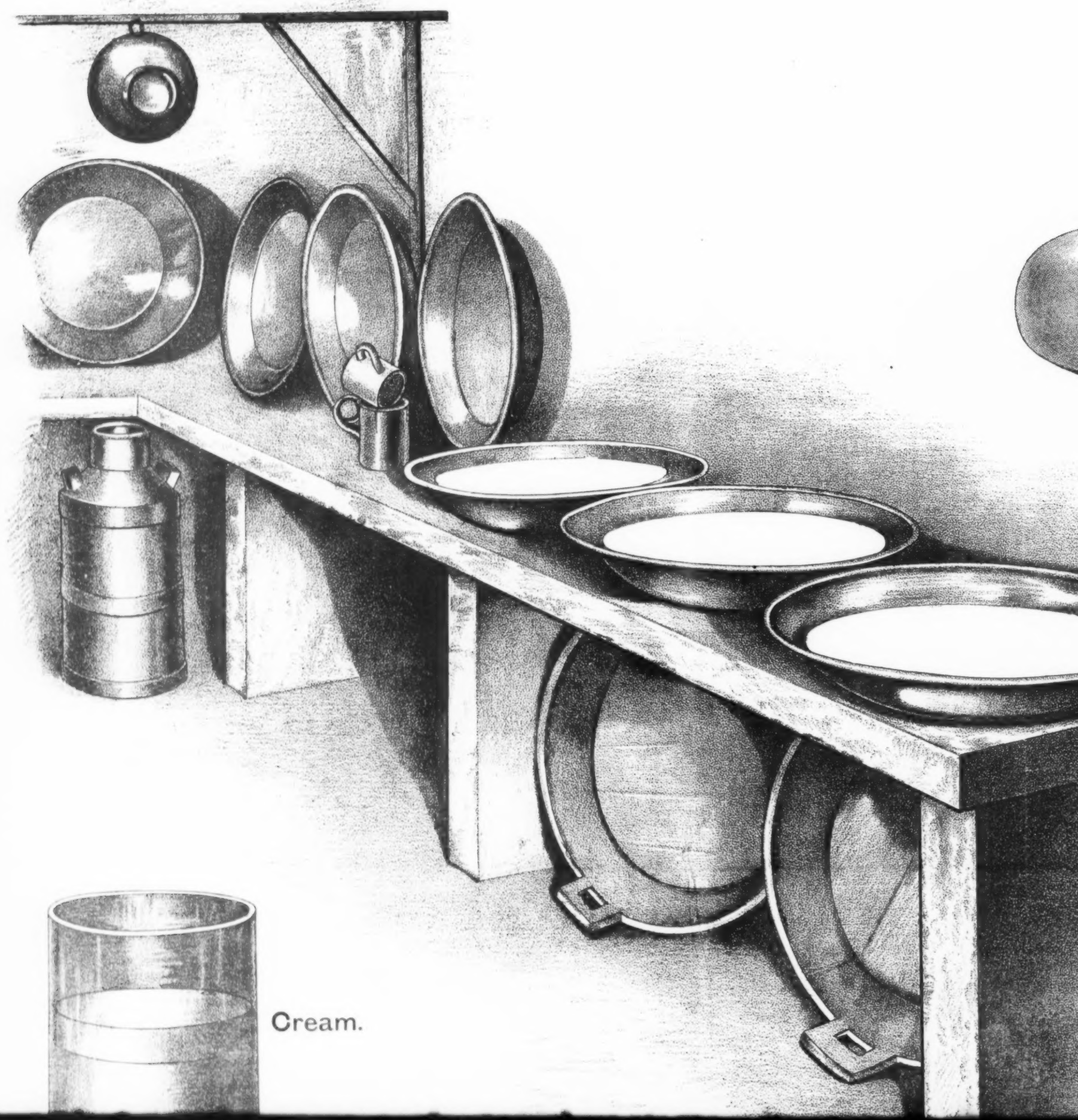

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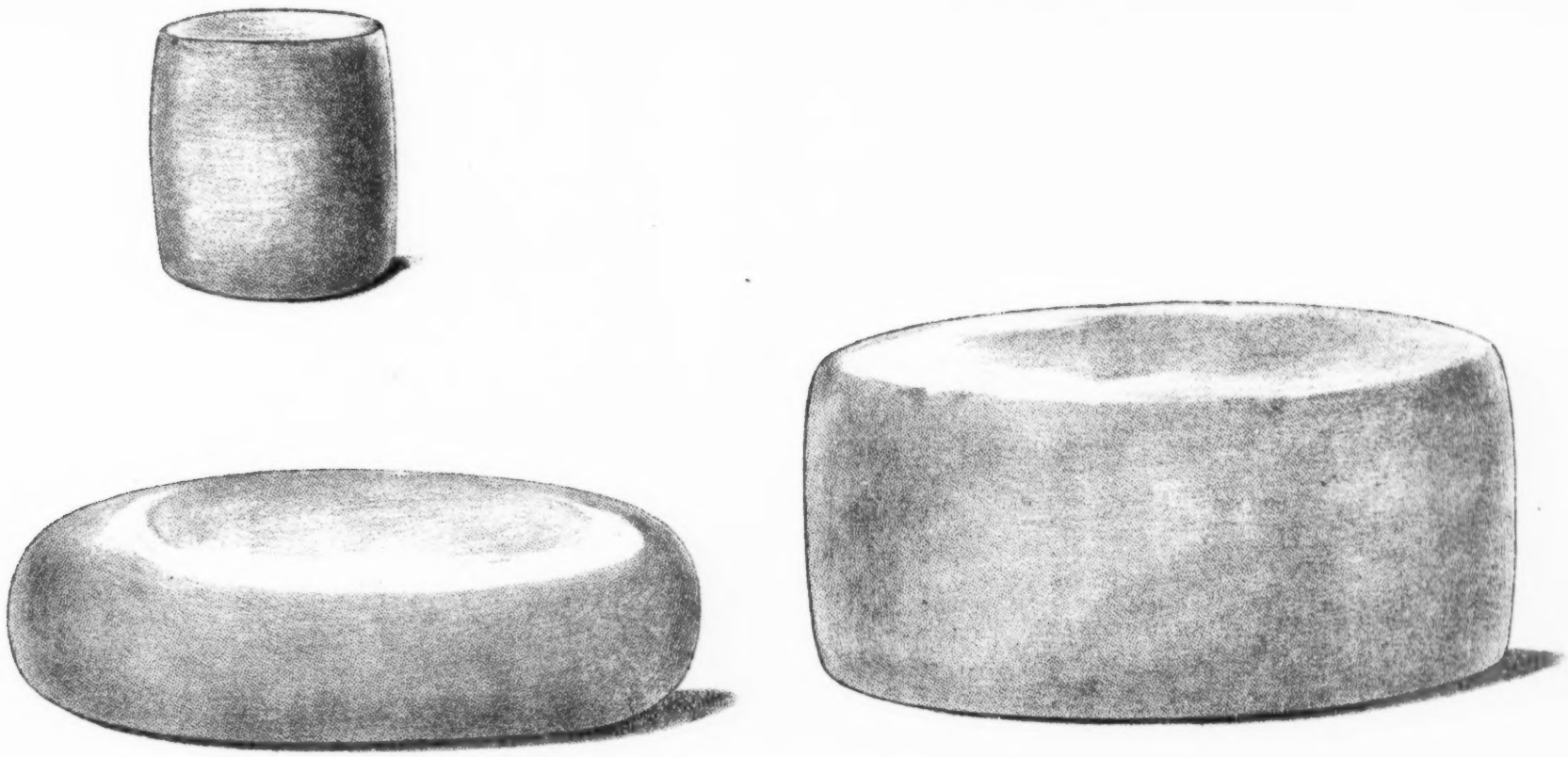

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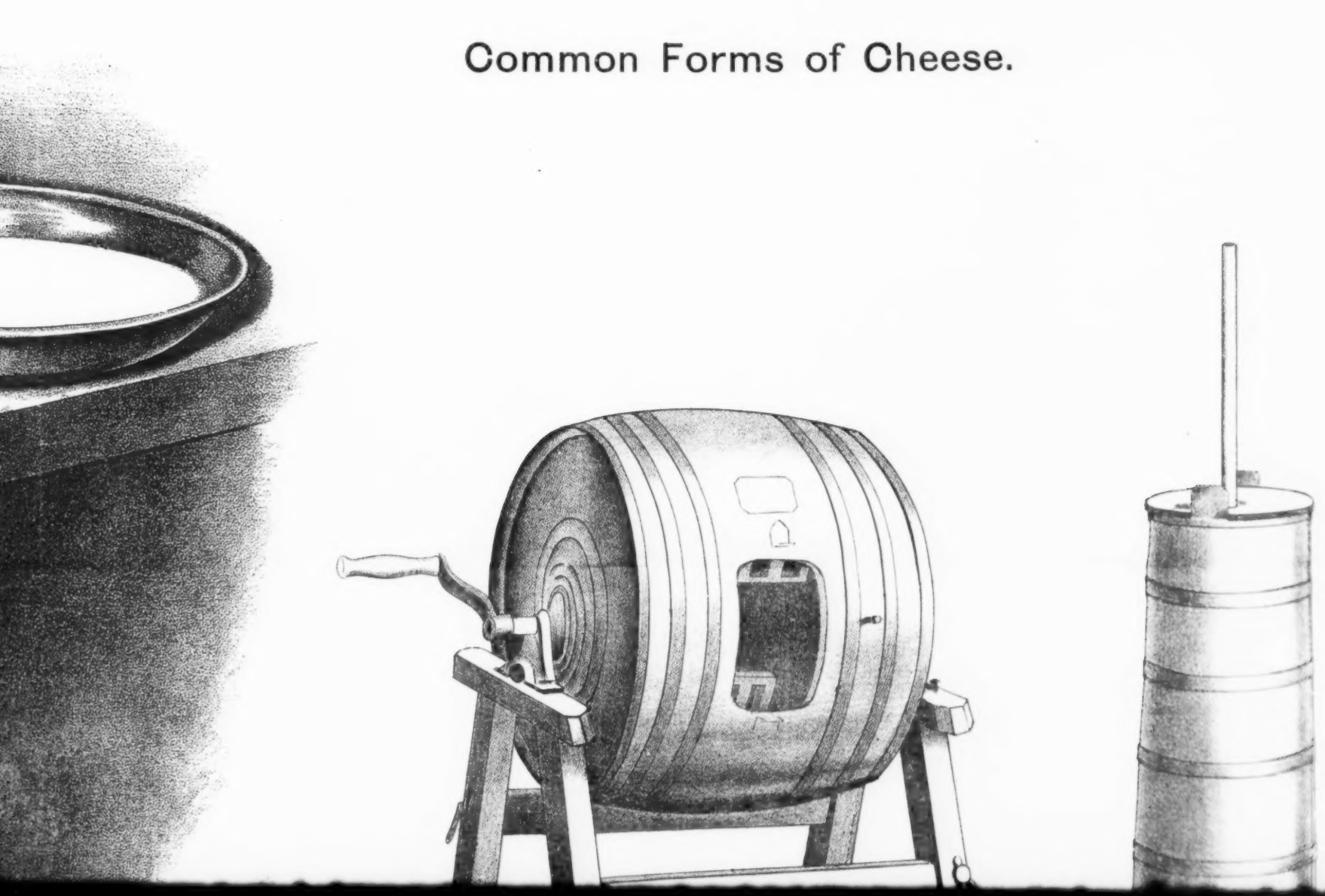

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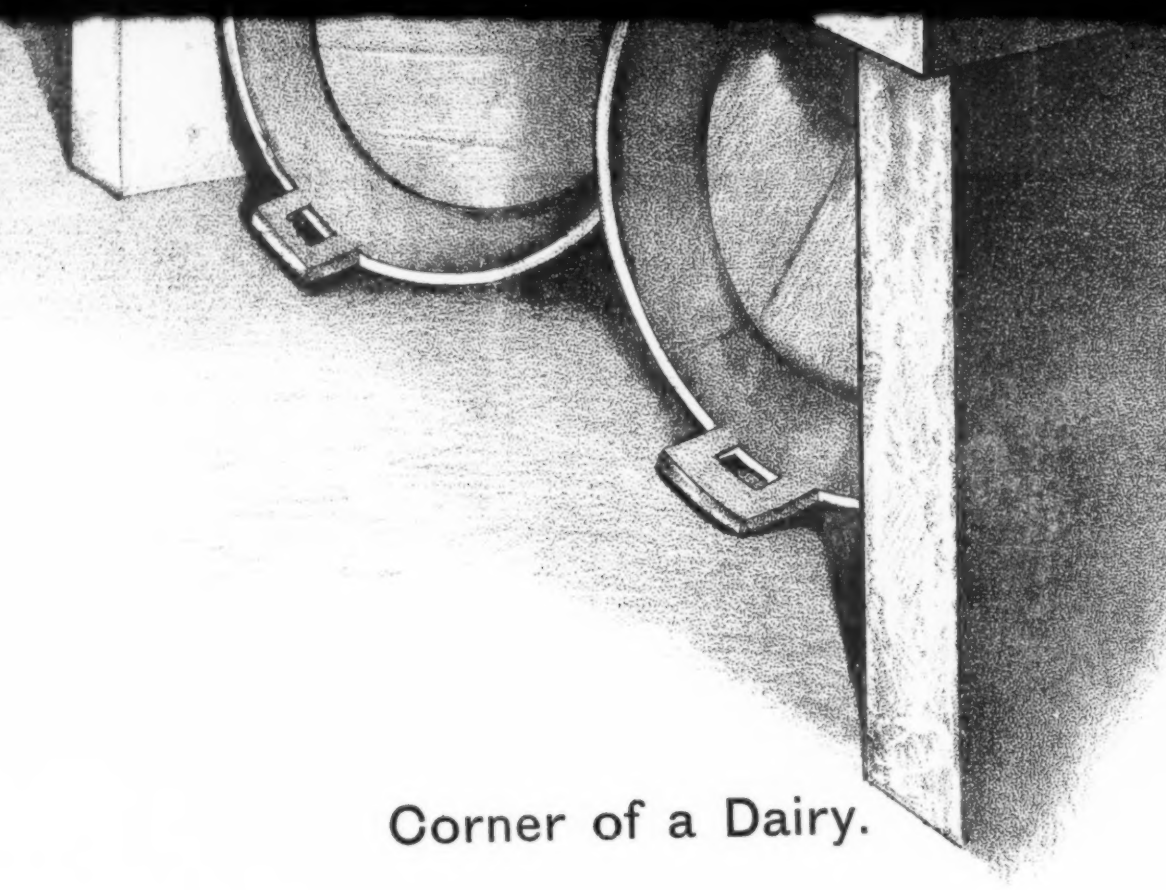

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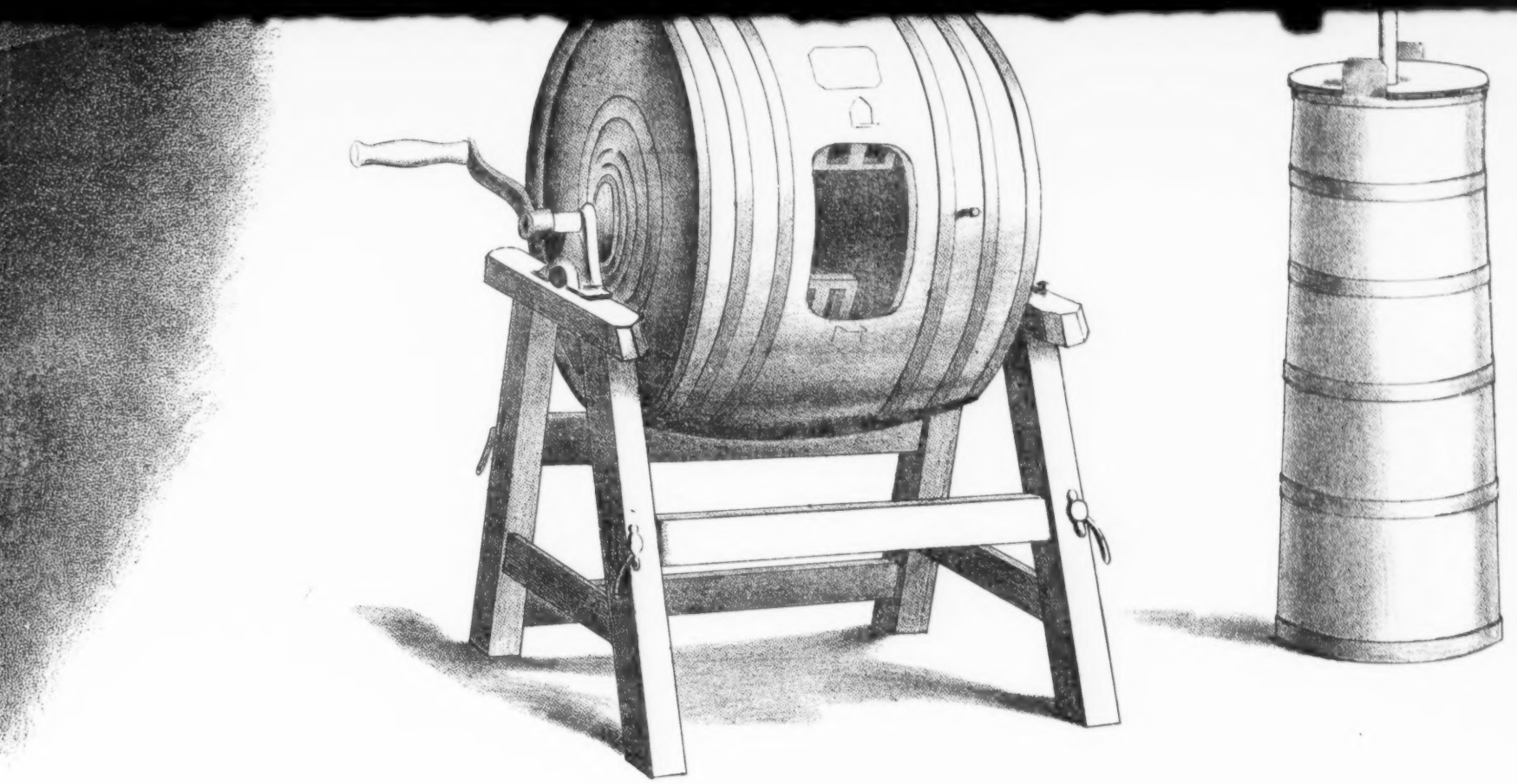

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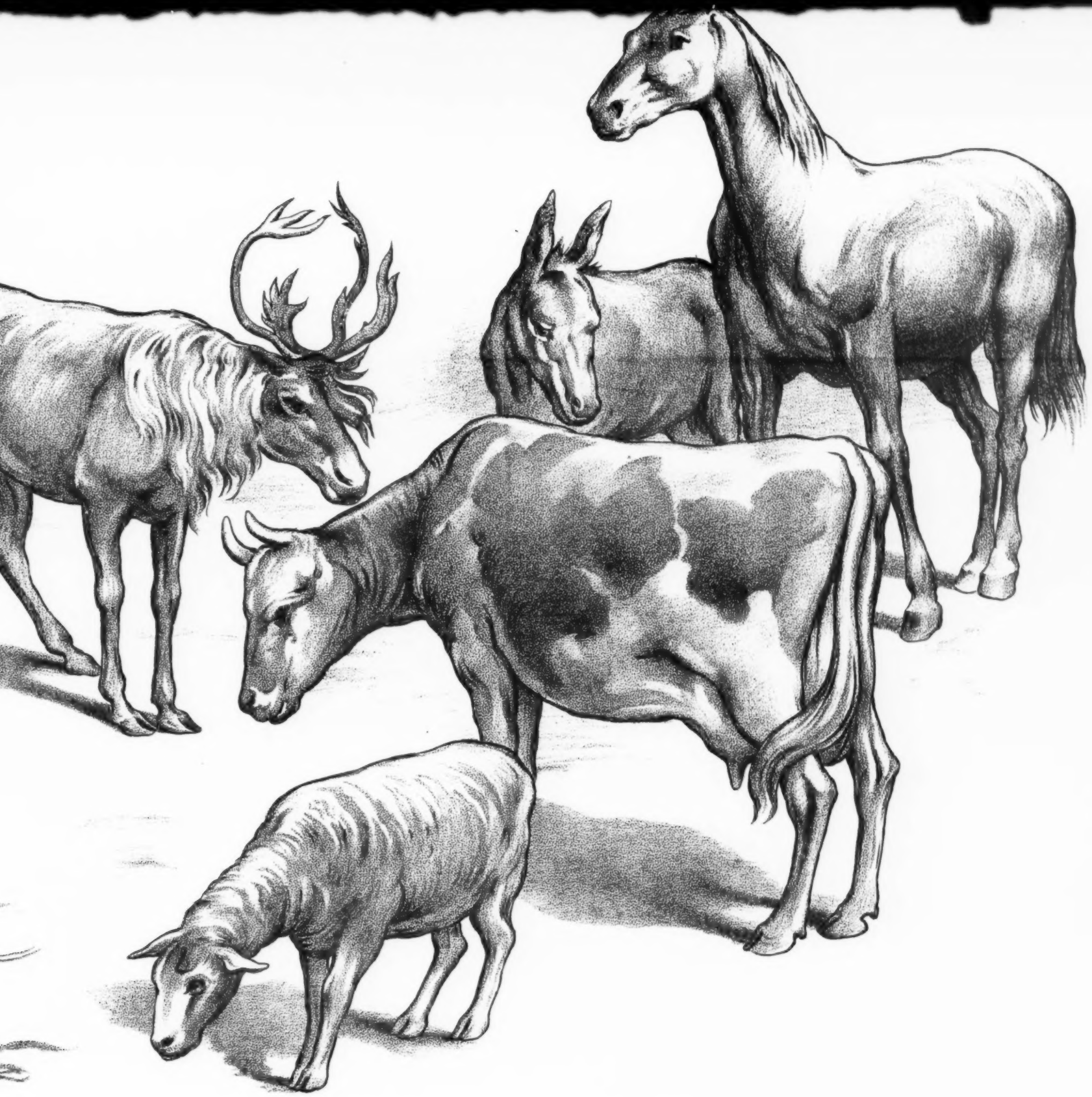

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